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ARMY MEDICAL DEPARTMENT

REPORT

FOR THE YEAR 1878.

VOLUME XX.

Presented to both Houses of Parliament by Command of Her Majesty.

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TO THE RIGHT HONOURABLE

THE SECRETARY OF STATE FOR WAR.

SIR,

IN accordance with instructions laid down for the conduct of business by the Director-General and Heads of Branches of the Army Medical Department, I have the honour to submit the accompanying Report on the Health of the Army in 1878, and on various matters connected with the duties of the Officers of the Department.

The Statistical and Sanitary Reports have been drawn up by the Officers in charge of the respective Branches.

I have the honour to be,
SIR,
Your most obedient
Humble Servant,
W. M. MUIR,
Director-General.

ARMY MEDICAL DEPARTMENT,
1880.

L 988. Wt. 194.

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ARMY MEDICAL DEPARTMENT REPORT FOR 1878.

STATISTICAL REPORT.

Troops at Home and Abroad.

THE average annual strength of the troops serving at home and abroad in 1878, as computed from the returns received by the Army Medical Department, was 185,006 non-commissioned officers and men (exclusive of the Royal Malta Fencible Artillery, the 1st and 2nd West India Regiments, and the Gun Lascars at Ceylon, and at Hong Kong, Corps which are not recruited at home); the admissions into hospital in this force were 198,074, and the deaths 2,299. The rates represented by these numbers are for admissions into hospital 1070·6, and for deaths 12·17 per 1,000 of the average annual strength, the latter being calculated on a strength of 188,883, which includes detached men.

The statistics of some of the most important of the results of sickness, in every Command in which the troops were stationed, are exhibited in the following Table:—

1878.

White Troops.	Average Annual Strength.	Admitted into Hospital.	Died.	Sent Home as Invalids.	Discharged as Invalids.	Constantly non-effective from Sickness.
Troops at Home and Abroad	**185,006**	**198,074**	**2,299**	**3,682**	**5,243**	**8,801·56**
United Kingdom	101,129	82,163	686	—	3,528	4,056·00
Gibraltar	4,702	3,157	31	238	116	175·00
Malta	6,201	5,537	76	302	173	308·00
Cyprus	894	3,931	36	135	19	—
Canada	1,725	1,012	10	27	18	51·47
Bermuda	2,017	1,325	12	34	10	71·27
West Indies	1,119	1,124	15	7	15	59·96
Cape of Good Hope and St. Helena	5,629	5,213	111	147	61	267·49
Mauritius	416	1,069	13	17	7	33·98
Ceylon	1,015	1,005	16	29	10	48·89
China and Straits Settlements	1,843	2,036	24	163	72	111·42
India	56,109	88,919	1,251	2,583	1,214	3,618·08
On board Ship	2,207	1,583	18	—	—	—

Troops at Home and Abroad.

1878.

White Troops.	Ratio per 1,000 of Strength.					Average sick-time to each Soldier.	Average duration of each case of Sickness.
	Admitted.	Died.	Sent Home as Invalids.	Discharged as Invalids.	Constantly non-effective from Sickness.		
	*	†	‡	§	‖	Days.	Days.
Troops at Home and Abroad	**1070·6**	**12·17**	**45·08**	**28·09**	**48·39**	**17·66**	**16·68**
United Kingdom	812·4	6·53	—	33·60	40·11	14·64	18·02
Gibraltar	671·4	6·59	50·62	24·67	37·22	13·58	20·23
Malta	892·9	12·26	48·70	27·89	49·67	18·15	20·31
Cyprus	4397·1	40·27	151·01	21·25	—	—	—
Canada	586·7	5·80	15·65	10·43	29·84	10·89	18·56
Bermuda	656·9	5·95	16·86	4·96	35·33	12·90	19·63
West Indies	1004·4	13·40	6·26	13·40	53·58	19·56	19·47
Cape of Good Hope and St. Helena	936·1	19·72	26·11	10·84	47·52	17·35	18·73
Mauritius	2369·7	31·23	40·87	16·83	81·68	29·81	11·60
Ceylon	990·1	15·76	28·57	9·85	48·17	17·58	17·72
China and Straits Settlements	1104·7	13·02	88·44	39·07	60·46	22·07	19·97
India	1584·8	22·30	46·04	21·64	64·48	23·54	14·85
On board Ship	717·2	8·16	—	—	—	—	—

* Calculated on strength, excluding men detached.
† Calculated on strength, including men detached.
‡ Calculated on strength, excluding United Kingdom, and sick on board ship.
§ Calculated on strength, including men detached, and excluding sick on board ship.
‖ Calculations exclude men detached and sick on board ship.

1868 to 1877.

Command.	Aggregate strength for 10 years.	Admissions into Hospital.	Deaths.	Men sent to England Invalids.	Discharged the Service as Invalids.	Average constantly sick.
Troops at Home and Abroad	**1,683,785**	**1,702,071**	**22,192**	**30,369**	**36,780**	**74,972**
United Kingdom	536,[illegible]	[illegible]	7,336	—	34,238	33,951
Gibraltar	45,158	[illegible]	306	[illegible]	745	1,546
Malta	48,[illegible]	[illegible]	574	1,520	816	1,974
Canada	50,568	[illegible]	345	74	353	1,179
Bermuda	[illegible]	[illegible]	[illegible]	[illegible]	253	613
West Indies	[illegible]	[illegible]	142	302	167	525
Cape of Good Hope and St. Helena	[illegible]	[illegible]	[illegible]	[illegible]	317	1,427
Mauritius	[illegible]	[illegible]	[illegible]	[illegible]	69	291
Ceylon	[illegible]	[illegible]	[illegible]	[illegible]	155	489
China and Straits Settlements	[illegible]	[illegible]	[illegible]	[illegible]	328	807
India	[illegible]	[illegible]	[illegible]	[illegible]	5,353	32,170
On board Ship	[illegible]	[illegible]	[illegible]	—	—	—

1868 to 1877.

Troops at Home and Abroad.

White Troops.	Ratio per 1,000 of Strength.					Average sick-time to each Soldier.	Average duration of each case of Sickness.
	Admitted.	Died.	Sent Home as Invalids.	Discharged as Invalids.	Constantly non-effective from Sickness.		
						Days.	Days.
Troops at Home and Abroad	**1010·9**	**12·82**	**37·75**	**21·24**	**46·56**	**16·99**	**16·21**
United Kingdom -	814·4	8·77	—	26·77	39·66	14·48	17·77
Gibraltar - -	657·4	6·76	26·01	16·24	34·16	12·47	18·97
Malta - -	801·5	10·60	25·27	16·76	40·56	14·80	18·26
Canada - -	625·5	8·72	18·55	13·98	29·80	10·88	17·39
Bermuda - -	676·1	12·19	22·61	13·59	32·92	12·02	17·77
West Indies - -	895·2	10·98	23·34	12·91	40·58	14·81	16·46
Cape of Good Hope and St. Helena -	962·6	10·20	23·32	16·96	46·80	17·08	17·74
Mauritius - -	1740·6	18·20	29·86	12·19	51·42	18·77	10·78
Ceylon - -	1022·3	16·49	36·56	15·87	50·08	18·28	17·88
China and Straits Settlements -	1289·7	15·01	41·75	20·14	49·55	18·09	14·02
India - - -	1394·7	20·34	42·61	15·56	55·88	20·40	14·12
On board Ship -	531·9	7·86	—	—	—	- -	—

II.—ON THE HEALTH OF THE TROOPS SERVING IN THE UNITED KINGDOM.

Sickness and Mortality.

STATISTICAL REPORT.

United Kingdom.

The average annual strength of the non-commissioned officers and men serving in the United Kingdom during the year calculated from the returns received was 101,129; the admissions into hospital in this number were 82,163, being in the rate of 812·4 per 1,000; there were 614 deaths amongst the men present with their corps, and 72 deaths amongst men detached (the average number of whom is given in the Adjutant-General's return as 3,877); the death-rate of the non-commissioned officers and men is therefore 6·53 per 1,000 of the strength.

Compared with the preceding year, the rate of admissions is 6 per 1,000 men higher, and the death-rate ·67 lower.

The classes and orders of diseases to which the admissions and deaths were due are shown in the following Table:—

Orders.	Average Strength in Annual Returns, 101,129. Average Strength, including Men detached, 105,006.	Admitted into Hospital.	Died. With the Regiment.	Died. Absent from the Regiment.	Died. Total.	Ratio per 1,000 of Mean Strength. 1878. Admitted.	1878. Died.	1869–77. Admitted.	1869–77. Died.
	I. *General Diseases.*								
1	Febrile Group	4,166	40	5	45	41·2	·43	51·0	·58
2	Constitutional Group	15,029	194	25	219	148·6	2·08	147·4	2·30
	II. *Local Diseases.*								
	Diseases of the—								
1	Nervous System	1,183	50	5	55	11·7	·52	12·0	·57
2	Eye	1,633	—	—	—	16·1	—	16·0	—
3	Ear	524	—	—	—	5·2	—	3·9	1·39
4	Nose	46	—	—	—	·5	—	·5	
5	Circulatory System	1,716	83	7	90	17·0	·86	14·0	
6	Absorbent "	1,551	—	—	—	15·3	—	13·9	·01
7	Ductless Glands	10	—	—	—	·1	—	·1	
8	Respiratory System	7,779	107	8	115	76·9	1·09	86·1	1·32
9	Digestive "	10,549	32	7	39	104·3	·37	105·4	·55
10	Urinary "	9,540	20	—	20	94·3	·19	98·9	·36
11	Generative "	1,199	—	—	—	11·9	—	12·3	
12	Organs of Locomotion	651	6	1	7	6·4	·07	5·1	·05
13	Cellular Tissue	2,484	—	—	—	24·6	—	22·5	·03
14	Cutaneous System	10,987	—	—	—	108·6	—	100·2	
	III. *Conditions, &c.*								
	Debility	1,354	—	—	—	13·4	—	8·4	·01
	IV. *Poisons*	241	4	—	4	2·4	·04	2·6	·06
	V. *Injuries.*								
1	Battle	—	—	—	—	—	—	—	—
2	Accidental	11,289	58	10	68	110·8	·65	105·9	·52
3	Homicidal	—	—	—	—	—	—	—	·03
4	Self-inflicted	12	20	—	20	·2	·19	·3	·25
5	Judicial	6	—	—	—		—		·01
	VI. *Surgical Operations*	32	—	—	—	·3	—	·3	·03
	No appreciable Disease	260	—	—	—	2·6	—	1·6	
	Cause unknown	—	—	4	4	—	·04	—	
	Total	82,163	614	72	686	812·4	6·53	806·4	8·49

GENERAL DISEASES.—The admission rate for this class of diseases shows an increase of 6·9 per 1,000 men over last year; the increase occurs entirely in the *constitutional group*, the rate for the *febrile group* being 6·4 per 1,000 lower. The rate of mortality is fractionally lower for both groups. The admissions and deaths from the principal diseases of this class are shown in the following Table :— *United Kingdom.*

Strength, 101,129. General Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength. Admitted.	Died.
Febrile Group.				
Eruptive Fevers	428	5	4·2	·05
Continued „	2,017	31	20·0	·29
Yellow Fever	—	—	—	—
Paroxysmal „	822	1	8·1	·01
Cholera	1	1		·01
Influenza	557	—	5·5	—
Erysipelas	177	3	1·8	·03
Other Diseases	164	4	1·6	·04
Total	4,166	45	41·2	·43
Constitutional Group.				
Rheumatism	4,721	6	46·7	·06
Syphilis	8,896	5	88·0	·05
Scrofula, Phthisis, &c.	1,215	194	12·0	1·84
Scurvy and Purpura	20	—	·2	—
Anæmia	137	—	1·3	—
Other Diseases	40	14	·4	·13
Total	15,029	219	148·6	2·08

Compared with the preceding year the admission rates for all the principal diseases of the *febrile group*, except eruptive fevers, are lower, and those for the *constitutional group* also show a lower rate, except for *syphilis*, in which there is an increase of 15·4 per 1,000 of the strength. The death-rates are lower in both groups for all the principal diseases.

LOCAL DISEASES.—The rates of admissions for *diseases of the eye, the ear, the circulatory, urinary, generative,* and *cutaneous systems*, and the *organs of locomotion*, are all a little higher than those for the preceding year; and there is a decrease in those for diseases of the *nervous, absorbent, respiratory*, and *digestive systems*, the most marked diminution being in the rate for *diseases of the respiratory system*, which is 10·1 per 1,000 men lower. The death-rates vary very little from those of 1877, the mortality in the whole class being lower by ·14 per 1,000.

CONDITIONS.—The rate of admissions is slightly higher than in the preceding year.

POISONS.—The rate of admissions is fractionally higher and that of deaths fractionally lower than for the preceding year.

INJURIES.—*Accidental.*—The admission rate is 3·4 per 1,000 men lower than that for 1877, the death rate is fractionally higher. *Self-inflicted.*—The rates differ but little from those of the preceding year. *Judicial.*—The six admissions were due to the punishment of men in the Military Prison at Cork.

United Kingdom.

The admissions, deaths, and average number constantly sick in the various Military Districts are shown in the following Table :—

Military Districts.	Average Annual Strength.	Admitted into Hospital.	Died.	Average Number constantly Sick.	Ratio per 1,000 of Mean Strength.			Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.
					Admitted.	Died.	Constantly Sick.		
								Days.	Days.
1. Northern -	9,866	7,949	69	368	805·7	6·99	37·30	13·61	16·90
2. Eastern - -	4,596	4,418	35	211	961·3	7·61	45·91	16·76	17·43
3. Western - -	6,518	5,215	35	264	800·1	5·37	40·50	14·78	18·48
4. Southern - -	9,493	7,905	70	427	832·7	7·38	44·98	16·42	19·72
5. Chatham - -	5,733	4,766	31	237	831·3	5·41	41·34	15·09	18·15
6. South-eastern -	8,945	6,303	49	338	704·6	5·47	37·79	13·79	19·57
7. Home - -	7,261	7,863	44	355	1014·0	6·06	48·89	17·85	17·60
8. Woolwich -	7,081	5,703	44	255	805·4	6·20	36·01	13·14	16·32
9. Aldershot -	13,775	10,356	70	614	751·7	5·08	44·57	16·27	21·64
10. North British -	4,114	3,107	32	148	755·2	7·78	35·98	13·13	17·39
11. Channel Islands	1,732	1,719	7	66	992·5	4·05	38·11	13·91	14·01
12. Belfast - -	2,479	1,755	16	69	707·9	6·44	27·83	10·16	14·35
13. Dublin - -	12,499	10,486	68	472	838·9	5·44	37·76	13·78	16·43
14. Cork - -	7,037	5,118	44	232	727·3	6·25	32·97	12·03	16·55
Detached from their Corps.	3,877	—	72	—	—	18·57	—	—	—
Total - -	105006	82,163	686	4,056	812·5	6·53*	40·11	14·64	18·02
„ 1868–77	—	—	—	—	814·4	8·77*	39·66	14·48	17·77

The Home District furnishes the highest rate of admissions, and exceeds that for the Channel Islands, the next highest, by 21·5 per 1,000 of the strength, and that for the South-Eastern, where the rate is lowest, by 309·4. The Western, Southern, Chatham, Woolwich, and Aldershot Districts, give higher rates of admission than last year, and the Northern, Eastern, North British, Belfast, and Dublin are lower. The Channel Islands show the lowest rate of mortality, and the North British District the highest. The Home District, as in the preceding year, furnishes the highest proportion constantly sick, and the longest average Sick-time to each soldier. The average duration of each case is the longest at Aldershot and the shortest in the Channel Islands. These Districts also gave the longest and shortest averages respectively in the preceding year.

* Calculated on strength including men detached.

The results of sickness in the four permanent Camps (which are included in the first Table) are separately grouped in the following one:— *United Kingdom.*

—	Average Annual Strength.	Admitted into Hospital.	Died.	Average Number constantly Sick.	Ratio per 1,000 of Mean Strength.			Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.
					Admitted.	Died.	Constantly Sick.		
Camps -	24,203	18,286	115	1,005	755·5	4·75	41·52	Days. 15·16	Days. 20·06

The rate of admissions is 4·9 per 1,000 men higher than in the preceding year; the death and the constantly sick rates are fractionally lower.

The admissions and deaths in each class and order of diseases are shown in the following Table:—

United Kingdom.

Class.	Order.	Districts - -	Northern.		Eastern.		Western.		Southern.		Chatham.		South-eastern.	
		Average Strength -	9,866		4,596		6,518		9,493		5,733		8,945	
		—	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I.		*General Diseases.*												
	1	Febrile Group -	283	2	235	1	260	3	471	7	171	1	267	1
	2	Constitutional „ -	1,634	27	614	12	834	7	1,087	22	895	12	1,046	16
II.		*Local Diseases.*												
		Diseases of the—												
	1	Nervous System -	107	5	74	2	70	4	127	5	44	3	122	5
	2	Eye - - -	126	—	120	—	97	—	174	—	82	—	119	—
	3	Ear - - -	28	—	30	—	34	—	42	—	35	—	45	—
	4	Nose - -	2	—	—	—	5	—	2	—	—	—	4	—
	5	Circulatory System	130	10	83	9	113	2	250	9	163	3	139	9
	6	Absorbent „	188	—	60	—	81	—	77	—	81	—	97	—
	7	Ductless Glands -	1	—	—	—	—	—	4	—	—	—	1	—
	8	Respiratory System	677	11	495	3	558	9	930	11	466	5	509	8
	9	Digestive „	759	4	684	2	762	2	1,096	2	646	—	886	2
	10	Urinary „	1,060	3	586	1	686	2	742	1	613	—	573	1
	11	Generative „	128	—	47	—	58	—	109	—	51	—	90	—
	12	Organs of Locomotion.	55	1	14	1	33	—	50	—	35	—	47	—
	13	Cellular Tissue -	241	—	169	—	147	—	159	—	121	—	202	—
	14	Cutaneous System	1,162	—	587	—	721	—	996	—	627	—	959	—
III		*Conditions, &c.*												
		Debility - -	67	—	56	—	63	—	201	—	145	—	153	—
IV.		*Poisons* - -	26	—	34	1	12	—	24	1	5	1	31	—
V.		*Injuries.*												
	2	Accidental - -	1,267	5	521	1	652	5	1,321	11	571	4	984	7
	4	Self-inflicted - -	1	1	—	2	—	1	3	1	1	2	—	—
	5	Judicial - -	—	—	—	—	—	—	—	—	—	—	—	—
VI.		*Surgical Operations* -	—	—	3	—	5	—	3	—	1	—	4	—
		No appreciable Disease	17	—	6	—	24	—	37	—	13	—	25	—
		Total - -	7,949	69	4,418	35	5,215	35	7,905	70	4,766	31	6,303	49

United Kingdom.

Home.		Woolwich.		Aldershot.		North British.		Channel Islands.		Belfast.		Dublin.		Cork.	
7,261		7,081		13,775		4,114		1,732		2,479		12,499		7,037	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died	Admitted.	Died.	Admitted.	Died.
264	2	637	3	512	5	110	3	46	1	94	1	443	7	373	3
2,037	15	946	14	1,903	21	584	7	277	1	267	2	2,162	23	753	15
95	5	95	2	140	5	31	2	19	1	22	—	165	8	74	3
96	—	109	—	269	—	44	—	13	—	45	—	202	—	137	—
15	—	55	—	121	—	16	—	5	—	4	—	56	—	38	—
3	—	5	—	8	—	3	—	1	—	—	—	9	—	4	—
75	3	141	8	228	11	53	7	49	—	41	1	167	5	84	6
97	—	67	—	273	—	60	—	62	—	34	—	303	—	71	—
—	—	—	—	1	—	—	—	—	—	—	—	1	—	2	—
799	5	389	10	763	9	391	6	216	2	114	5	984	17	488	6
822	6	887	2	1,244	7	409	2	216	—	184	1	1,266	1	688	1
827	2	592	2	1,234	2	299	2	287	—	241	2	1,239	1	461	1
97	—	80	—	206	—	46	—	15	—	31	—	178	—	63	—
45	—	55	—	139	3	23	—	13	—	16	—	77	1	49	—
324	—	126	—	351	—	107	—	42	—	65	—	253	—	177	—
721	—	580	—	1,570	—	375	—	198	—	289	—	1,411	—	791	—
115	—	74	—	163	—	34	—	21	—	55	—	174	—	33	—
19	—	17	—	14	—	13	—	15	—	4	—	10	—	17	1
804	3	785	1	1,185	5	504	3	224	1	245	3	1,353	3	793	6
2	3	—	2	2	2	1	—	—	1	1	1	1	2	—	2
—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	—
2	—	1	—	1	—	2	—	—	—	1	—	8	—	1	—
4	—	62	—	29	—	2	—	—	—	2	—	24	—	15	—
7,363	44	5,703	44	10,356	70	3,107	32	1,719	7	1,755	16	10,486	68	5,118	44

United Kingdom.

Ratio per 1,000

Class.	Order.	Districts.	Northern.		Eastern.		Western.		Southern.		Chatham.		South-eastern.	
		—	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
I.		*General Diseases.*												
	1	Febrile Group -	23·7	·20	51·1	·22	39·9	·46	49·6	·74	29·8	·17	29·9	·11
	2	Constitutional „ -	164·6	2·74	133·6	2·61	127·9	1·07	114·5	2·32	156·1	2·09	116·9	1·79
II.		*Local Diseases.*												
		Diseases of the—												
	1	Nervous System -	10·9	·51	16·1	·43	10·7	·61	13·4	·52	7·7	·53	13·6	·56
	2	Eye - - -	12·8	—	26·1	—	14·9	—	18·3	—	14·3	—	13·3	—
	3	Ear - - -	·8	—	6·5	—	5·2	—	4·4	—	6·1	—	5·0	—
	4	Nose - -	·2	—	—	—	·8	—	·2	—	—	—	·4	—
	5	Circulatory System	13·2	1·01	18·1	1·96	17·3	·31	26·3	·94	23·4	·53	15·5	1·01
	6	Absorbent „	19·1	—	13·1	—	12·4	—	8·1	—	14·1	—	10·8	—
	7	Ductless Glands -	·1	—	—	—	—	—	·4	—	—	—	·1	—
	8	Respiratory System	68·6	1·11	107·7	·65	85·6	1·38	98·0	1·16	81·3	·87	56·9	·89
	9	Digestive „	76·9	·41	146·8	·43	116·9	·31	115·5	·21	112·7	—	99·1	·22
	10	Urinary „	107·4	·30	127·5	·22	105·3	·31	78·2	·11	106·9	—	64·1	·11
	11	Generative „	13·0	—	10·2	—	8·9	—	11·5	—	8·9	—	10·1	—
	12	Organs of Locomotion.	5·6	·10	3·0	·22	5·1	—	5·3	—	6·1	—	5·3	—
	13	Cellular Tissue -	24·4	—	36·8	—	22·6	—	16·7	—	21·1	—	23·6	—
	14	Cutaneous System	117·8	—	127·7	—	110·6	—	104·9	—	109·4	—	107·2	—
III.		*Conditions, &c.*												
		Debility - -	6·8	—	12·2	—	9·7	—	21·2	—	25·3	—	17·1	—
IV.		*Poisons.*	2·6	—	7·4	·22	1·8	—	2·5	·11	·9	·17	3·5	—
V.		*Injuries.*												
	3	Accidental - -	128·4	·51	113·4	·22	100·0	·77	139·2	1·16	99·6	·70	110·0	·78
	4	Self-inflicted - -	·1	·10	—	·43	—	·15	·3	·11	·2	·35	—	—
	5	Judicial - -	—	—	—	—	—	—	—	—	—	—	—	—
VI.		*Surgical Operations.*	—	—	·7	—	·8	—	·3	—	·2	—	·4	—
		No appreciable Disease	1·7	—	1·3	—	3·7	—	3·9	—	2·2	—	2·3	—
		Total -	805·7	6·99	961·3	7·61	800·1	5·37	832·7	7·38	831·3	5·41	704·6	5·47

of Strength.

United Kingdom.

Home.		Woolwich.		Aldershot.		North British.		Channel Islands.		Belfast.		Dublin.		Cork.	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
36·4	·28	89·9	·43	37·2	·37	26·7	·73	26·6	·58	37·9	·40	35·4	·56	53·0	·43
280·5	2·06	183·6	1·97	138·1	1·52	142·0	1·70	159·9	·58	107·7	·80	173·0	1·84	107·0	2·13
13·1	·69	13·4	·28	10·2	·37	7·5	·49	11·0	·58	8·9	—	13·2	·64	10·5	·43
13·2	—	15·4	—	19·5	—	10·7	—	7·5	—	18·2	—	16·2	—	19·5	—
2·1	—	7·8	—	8·8	—	3·9	—	2·9	—	1·6	—	4·5	—	5·4	—
·4	—	·7	—	·6	—	·7	—	·6	—	—	—	·7	—	·6	—
19·3	·41	19·9	1·13	16·5	·79	12·9	1·70	28·3	—	16·5	·40	13·4	·40	11·9	·85
13·3	—	9·5	—	19·8	—	14·6	—	35·8	—	13·7	—	24·2	—	10·1	—
—	—	—	—	·1	—	—	—	—	—	—	—	·1	—	·3	—
110·0	·69	54·9	1·41	55·4	·65	95·0	1·45	124·7	1·15	46·0	2·02	78·7	1·36	69·3	·85
113·2	·83	125·2	·28	90·3	·50	99·4	·49	124·7	—	74·2	·40	101·3	·08	97·8	·14
127·7	·28	83·8	·28	89·6	·15	72·7	·49	165·7	—	97·2	·80	99·1	·08	65·5	·14
13·3	—	11·3	—	14·9	—	11·2	—	8·7	—	12·5	—	14·2	—	9·0	—
6·2	—	7·8	—	10·1	·21	5·6	—	7·5	—	6·5	—	6·2	·08	7·0	—
44·6	—	17·8	—	25·5	—	26·0	—	24·2	—	26·2	—	20·2	—	25·2	—
99·3	—	81·9	—	114·0	—	91·1	—	114·3	—	116·6	—	112·9	—	112·4	—
15·8	—	10·4	—	11·8	—	8·3	—	12·1	—	22·2	—	13·9	—	4·7	—
2·6	—	2·4	—	1·0	—	3·2	—	8·7	—	1·6	—	·8	—	2·4	·14
110·9	·41	110·9	·14	86·0	·37	122·5	·73	129·3	·58	98·8	1·22	108·3	·24	112·7	·85
·3	·41	—	·28	·1	·15	·2	—	—	·58	·4	.40	·1	·16	—	·29
—	—	—	—	—	—	—	—	—	—	—	—	—	—	·8	—
·3	—	·1	—	·1	—	·5	—	—	—	·4	—	·6	—	·1	—
·5	—	8·7	—	2·1	—	·5	—	—	—	·8	—	1·9	—	2·1	—
1014·9	6·06	805·4	6·20	751·7	5·08	755·2	7·78	992·5	4·05	707·9	6·44	838·9	5·44	727·3	6·25

United Kingdom.

GENERAL DISEASES.—Compared with the preceding year the rate of admissions Home by 1·4, for the Woolwich by 2·8, for the Aldershot by 5·3, for the North by 10·8, and for Cork by 20·6. The rate is lower for each of the other districts. The rates of admissions and of deaths in the two groups of this class are shown

Districts		Northern.		Eastern.		Western.		Southern.		Chatham.		South-eastern.	
Average Strength		9,866		4,596		6,518		9,493		5,783		8,945	
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Febrile Group.	Eruptive Fevers	32	—	12	—	12	—	51	1	32	1	32	—
	Continued „	136	2	170	1	184	2	175	5	68	—	125	1
	Paroxysmal „	63	—	45	—	43	—	208	—	62	—	98	—
	Cholera	1	—	—	—	—	—	—	—	—	—	—	—
	Influenza	23	—	5	—	1	—	2	—	1	—	4	—
	Erysipelas	22	—	1	—	17	1	17	1	5	—	6	—
	Other Diseases	6	—	2	—	3	—	18	—	3	—	2	—
	Total	283	2	235	1	260	3	471	7	171	1	267	1
Constitutional Group.	Rheumatism	372	—	240	1	369	—	433	1	380	1	460	—
	Syphilis	1,117	1	302	—	392	—	482	—	410	—	462	—
	Scrofula, Phthisis, &c.	106	24	70	11	60	7	159	19	90	11	107	16
	Scurvy and Purpura	3	—	—	—	2	—	1	—	—	—	—	—
	Anæmia	20	—	1	—	8	—	9	—	15	—	9	—
	Other Diseases	6	2	1	—	3	—	3	2	—	—	8	—
	Total	1,624	27	614	12	834	7	1,087	22	895	12	1,046	16
		Ratio per 1,000											
Febrile Group.	Eruptive Fevers	3·3	—	2·6	—	1·8	—	5·4	·11	5·6	·17	3·6	—
	Continued „	13·8	·20	37·0	·22	28·2	·31	18·4	·52	11·8	—	14·0	·11
	Paroxysmal „	6·4	—	9·8	—	6·6	—	21·9	—	10·8	—	11·0	—
	Cholera	·1	—	—	—	—	—	—	—	—	—	—	—
	Influenza	2·3	—	1·1	—	·2	—	·2	—	·2	—	·4	—
	Erysipelas	2·2	—	·2	—	2·6	·15	1·8	·11	·9	—	·7	—
	Other Diseases	·6	—	·4	—	·5	—	1·9	—	·5	—	·2	—
	Total	28·7	·20	51·1	·22	39·9	·46	49·6	·74	29·8	·17	29·9	·11
Constitutional Group.	Rheumatism	37·7	—	52·2	·22	56·6	—	45·6	·11	66·3	·17	51·4	—
	Syphilis	113·2	·10	65·7	—	60·1	—	50·8	—	71·5	—	51·6	—
	Scrofula, Phthisis, &c.	10·8	2·44	15·3	2·39	9·2	1·07	16·8	2·00	15·7	1·92	12·0	1·79
	Scurvy and Purpura	·3	—	—	—	·3	—	·1	—	—	—	—	—
	Anæmia	2·0	—	·2	—	1·2	—	·9	—	2·6	—	1·0	—
	Other Diseases	·6	·20	·2	—	·5	—	·3	·21	—	—	·9	—
	Total	164·6	2·74	133·6	2·61	127·9	1·07	114·5	2·32	156·1	2·09	116·9	1·79

for diseases of this class is higher for the South-eastern District by 7·9, for the British by 18, for the Channel Islands by 30·5, for Belfast by 26·1, for Dublin in the following Tables. *United Kingdom.*

Home.		Woolwich.		Aldershot.		North British.		Channel Islands.		Belfast.		Dublin.		Cork.	
7,261		7,081		13,775		4,114		1,732		2,479		12,499		7,037	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
21	—	21	—	54	2	9	1	9	—	11	—	66	—	66	—
143	—	116	3	293	2	55	2	8	—	61	1	304	7	179	3
36	—	81	—	71	—	26	—	5	—	10	—	32	—	42	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
37	—	376	—	2	—	13	—	6	—	7	—	18	—	62	—
20	—	12	—	33	—	6	—	6	1	5	—	7	—	20	—
7	2	31	—	59	1	1	—	12	—	—	—	16	—	4	—
264	2	637	3	512	5	110	3	46	1	94	1	443	7	373	3
379	—	268	1	765	1	161	—	81	—	103	—	486	—	224	1
1,524	—	585	1	983	1	362	—	167	—	137	—	1,539	2	434	—
120	15	70	10	142	17	56	7	15	1	25	1	121	20	74	14
1	—	4	—	1	—	2	—	—	—	—	—	5	—	1	—
13	—	14	—	4	—	3	—	13	—	2	—	7	—	19	—
—	—	5	2	8	2	—	—	1	—	—	1	4	1	1	—
2,037	15	946	14	1,903	21	584	7	277	1	267	2	2,162	23	753	15

of Strength.

2·9	—	2·9	—	3·9	·15	2·2	·24	5·2	—	4·5	—	5·3	—	9·4	—
19·7	—	16·4	·42	21·3	·15	13·4	·49	4·6	—	24·6	·40	24·3	·56	25·4	·43
5·0	—	11·4	—	5·2	—	6·3	—	2·9	—	4·0	—	2·5	—	6·0	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5·1	—	53·1	—	·1	—	3·2	—	3·5	—	2·8	—	1·4	—	8·8	—
2·7	—	1·7	—	2·4	—	1·4	—	3·5	·58	2·0	—	·6	—	2·8	—
1·0	·28	4·4	—	4·3	·07	·2	—	6·9	—	—	—	1·3	—	·6	—
36·4	·28	89·9	·42	37·2	·37	26·7	·73	26·6	·58	37·9	·40	35·4	·56	53·0	·43
52·2	—	37·8	·14	55·5	·07	39·2	—	46·8	—	41·5	—	38·9	—	31·9	·14
209·9	—	82·6	·14	71·3	·07	88·0	—	96·4	·58	55·3	·40	123·1	·16	61·7	—
16·5	2·06	9·9	1·41	10·3	1·23	13·6	1·70	8·6	—	10·1	—	9·7	1·60	10·5	1·99
·1	—	·6	—	·1	—	·5	—	—	—	—	—	·4	—	·1	—
1·8	—	2·0	—	·3	—	·7	—	7·5	—	·8	—	·6	—	2·7	—
—	—	·7	·28	·6	·15	—	—	·6	—	—	·40	·3	·08	·1	—
280·5	2·06	133·6	1·97	138·1	1·52	142·0	1·70	159·9	·58	107·7	·80	173·0	1·84	107·0	2·13

United Kingdom.

Eruptive Fevers.—Compared with 1877 the rate of admissions is higher for these fevers in the Northern, Chatham, Aldershot, Channel Islands, Belfast, Dublin, and Cork Districts; and lower in the others. The highest rate in the year under report is in the Cork District, and is due chiefly to an outbreak of measles.

Continued Fevers.—Compared with the preceding year the rate of admissions is higher for the Eastern District by 4·6 per 1,000 of the strength, for the Western by 14·1, for Aldershot by 5·4, for the North British by 5·3, for Belfast by 6, for Dublin by 1·2, and for Cork by ·8. The rate is lower for each of the remaining districts, the greatest decrease being in the Chatham, where it is 34·3 lower.

Typhus Fever.—There were six admissions for this form of fever, of which three took place in the Dublin District, one in the South-eastern, one in the North British, and one in the Belfast.

Enteric Fever.—The admissions for this fever for all districts together were 112, being in the rate of 1·11 per 1,000 of the strength, which is ·22 per 1,000 higher than the rate for the preceding year. The deaths were 23 in number against 28 in 1877, and the proportion of deaths to those attacked was 205·4 per 1,000 against 341·9, or a lower rate by 136·5. The highest rates of prevalence were in the Woolwich and Dublin Districts, where they were 3·67 and 2·40 per 1,000, respectively. There was no admission in the Chatham District, and the South-eastern and Channel Islands gave only one each.

Simple Continued Fever.—The highest rates of prevalence of this form of fever are observed in the Home, Belfast, Cork, and Dublin Districts; for the first-named the rate is 10·88, for the next 10·48, for the next 6·39, and for Dublin 6·08 per 1,000 of the strength. Four deaths are returned, two for the Cork, and one respectively for the Dublin and Southern Districts.

Febricula.—The rate of admissions for all districts together is 15·46 per 1,000 of the strength, being a decrease of 3·09 per 1,000 men on the rate of the preceding year. There is no death returned under this head. The highest rate of admission is for the Eastern District where it is 29·46 per 1,000 men; the lowest is for the Channel Islands, where it is 1·73.

Paroxysmal Fevers.—The rate of admissions for these forms of fevers for all districts together is ·5 per 1,000 men lower than in the preceding year, the rate is higher for the Southern by 12·9 per 1,000 men, for the South-eastern by 2·3, for the Home by ·8, for Aldershot by 1·3, for Belfast by 1·8, and for the Cork District by 2·1. The rate is lower for the Northern by 2·4 per 1,000, for the Eastern by 6·2, for the Western by 13, for the Chatham by 7·5, for the Woolwich by 7·1, for the North British by 2·5, for the Channel Islands by ·7, and for the Dublin District by ·3. The high rate for the Southern District is no doubt due to the force being mainly made up of troops recently returned from foreign service. There was but one death.

Influenza.—This affection, as in the preceding year, was in a great measure confined to the Woolwich District, 376 of the 557 admissions having been returned from that Command, the ratio being as high as 53·1 per 1,000 men. The Cork District, which shows the next highest rate, is 8·8, and the lowest rate is for Aldershot, where it is only ·1 per 1,000.

Erysipelas.—The rate of admissions for all districts together is ·6 per 1,000 men lower than in the preceding year; for the Northern District there is a decrease of ·8 per 1,000 men, for the Eastern of 3·1, for the Western of ·5, for the Chatham of ·1, for the South-eastern of 1·9, for the Home of 1·7, for Woolwich of ·9, for the North British of 1·9, for Belfast of 1·1, and for Dublin of 1·2. The rate is higher for the Southern District by ·2, for the Aldershot by ·3, for the Channel Islands by 3·5, and for the Cork by ·4.

Rheumatism.—The rate of admissions for all districts together is 1·6 per 1,000 of the strength lower than that for 1877; the rate is lower for the Northern District by ·7 per 1,000, for the Eastern by 9·3, for the Home by 5·4, for the Aldershot by 7·7, for the North British by ·9, for the Dublin by 7·5, and for the Cork by 4·9; for the other districts the rates are higher, the greatest increase being for the Channel Islands, where it is 18·9 higher.

Syphilis.—For all districts together the rate of admissions is 15·4 per 1,000 of the strength higher than in the preceding year, due no doubt to the calling out of the reserve forces.

The following Table, compiled from the Quarterly Venereal Returns, shows the number of admissions for Primary Venereal Sores and Gonorrhœa at Home Stations where the Contagious Diseases Act is in force during the years 1874, 1875, 1876, 1877, and 1878.

Year.	Mean Strength.	Admitted into Hospital.						Annual Ratio per 1,000 of Average Strength.					
		For Primary Venereal Sores.			For Gonorrhœa.			For Primary Venereal Sores.			For Gonorrhœa.		
		Stated to have been contracted in the District.	Stated to have been contracted out of the District.	Total.	Stated to have been contracted in the District.	Stated to have been contracted out of the District.	Total.	Stated to have been contracted in the District.	Stated to have been contracted out of the District.	Total.	Stated to have been contracted in the District.	Stated to have been contracted out of the District.	Total.
1874 -	48,549	1,433	587	2,020	2,024	669	2,693	29·52	12·09	41·61	41·69	13·78	55·47
1875 -	48,656	1,108	651	1,759	1,771	835	2,606	22·77	13·38	36·15	36·40	17·16	53·56
1876 -	51,733	1,041	605	1,646	2,066	755	2,821	20·12	11·69	31·81	39·94	14·59	54·53
1877 -	53,096	1,010	830	1,840	1,889	1,108	2,997	19·02	15·63	34·65	35·58	20·87	56·45
1878 -	55,661	1,211	982	2,193	2,020	1,484	3,504	21·76	17·64	39·40	36·29	26·66	62·95

In some instances the information given in this return is based upon the verbal statements of the patients themselves, and therefore is not strictly reliable as a whole; but taken generally it may be accepted as substantially correct.

United Kingdom.

In continuation of the statistical information given in the reports of previous years, the admissions for primary venereal sores at certain large stations in the United Kingdom, and their rates per 1,000 of the average annual strength, are shown in the following Table:

Stations under the Act.

Stations.	Average Annual Strength.	Admitted for Primary Venereal Sores.	Admitted for Gonorrhœa.	Ratio per 1,000 of the Strength admitted for Primary Venereal Sores.	Ratio per 1,000 of the Strength admitted for Gonorrhœa.
Devonport and Plymouth	3,227	111	322	34	100
Portsmouth	5,733	84	372	15	65
Chatham, Sheerness, and Gravesend.	5,734	280	586	49	102
Woolwich	6,435	244	506	38	79
Aldershot	13,775	730	1,156	53	84
Windsor	1,096	43	80	39	73
Shorncliffe	3,314	136	143	41	43
Colchester	2,863	53	262	19	92
Winchester	1,129	43	124	38	110
Dover	3,244	102	203	31	63
Canterbury	1,460	40	83	27	57
Maidstone	146	1	11	7	75
Cork	2,439	88	107	36	44
Curragh	5,218	280	397	54	76
Total of 14 stations under the Act	55,813	2,235	4,352	40	78

Stations *not* under the Act.

Stations.	Average Annual Strength.	Admitted for Primary Venereal Sores.	Admitted for Gonorrhœa	Ratio per 1,000 of the Strength admitted for Primary Venereal Sores.	Ratio per 1,000 of the Strength admitted for Gonorrhœa.
Isle of Wight	1,311	66	79	50	60
London	4,246	1,060	640	250	151
Warley	722	101	116	140	161
Hounslow	774	31	48	40	62
Pembroke Dock	963	12	44	12	46
Sheffield	840	81	137	96	163
Manchester	1,199	246	212	205	177
Preston	965	70	141	73	146
Edinburgh	1,366	98	137	72	100
Fermoy	694	18	52	26	75
Limerick	918	78	96	85	105
Athlone	760	22	54	29	71
Dublin	5,067	779	639	154	126
Belfast	924	61	113	66	122
Total of 14 stations *not* under the Act	20,749	2,723	2,508	131	121

United Kingdom.

Stations.	Rate of Admissions into Hospital per 1,000 of Mean Strength for Primary Venereal Sores in—											
	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.*	1875.*	1876.*	1877*	1878.*
Devonport and Plymouth.	76	66	74	58	50	59	37	36	29	27	28	34
Portsmouth -	116	86	62	51	41	40	44	48	30	27	27	15
Chatham and Sheerness.	71	63	41	47	65	49	41	33	17	33	43	49
Woolwich -	88	46	52	43	58	60	60	47	59	42	29	38
Aldershot -	81	77	63	67	65	62	72	52	46	47	46	53
Windsor - -	58	136	93	67	78	96	84	63	41	41	80	39
Shorncliffe -	42	77	60	100	30	33	21	14	18	22	21	41
Colchester -	145	182	85	42	33	55	42	20	32	30	52	19
Winchester -	52	104	101	61	29	57	27	38	27	20	18	38
Dover - -	132	111	80	30	24	47	38	37	27	30	19	31
Canterbury -	119	114	45	152	38	43	20	36	12	27	19	27
Maidstone -	242	122	128	68	44	57	59	66	7	28	34	7
Cork - -	72	61	73	68	55	62	61	26	21	21	16	36
Curragh - -	104	85	88	56	35	50	30	46	35	18	38	54
Isle of Wight -	59	103	129	64	66	57	37	89	89	54	51	50
London - -	163	146	144	160	190	199	185	179	187	146	166	250
Warley - -	74	92	61	55	57	66	22	32	37	51	59	140
Hounslow -	62	106	85	88	45	90	67	68	24	75	48	40
Pembroke Dock -	28	35	51	54	28	27	25	21	31	29	16	12
Sheffield - -	163	107	146	77	126	98	71	49	87	119	64	96
Manchester -	177	115	160	92	70	98	91	106	89	113	131	205
Preston - -	87	87	172	134	75	114	123	97	57	77	77	73
Edinburgh -	63	46	60	99	69	43	44	25	27	89	47	72
Fermoy - -	70	47	116	89	33	56	21	10	12	31	29	26
Limerick - -	117	114	54	136	57	100	78	58	25	47	75	85
Athlone - -	85	38	42	44	47	14	14	8	10	8	35	29
Dublin - -	129	139	180	128	117	165	136	95	73	76	103	154
Belfast - -	89	56	52	43	61	78	103	64	44	57	43	66

The group of 14 stations under the Act shows an increase of 5 per 1,000 men on the corresponding rate of the preceding year; the contrasted group of 14 stations not under the Act shows an increase of 40 per 1,000 men.

* Stoppage of pay in force.

United Kingdom.

The results obtained by a different grouping of the stations in the United Kingdom are shown in the following Table :—

Groups.	Average Annual Strength.	Admissions into Hospital for Primary Venereal Sores.	Ratio per 1,000 of the Strength of Admissions for Primary Venereal Sores.
The 14 stations under the Contagious Diseases Act.	55,813	2,235	40
All other stations - -	45,316	3,905	86

No admissions for this disease are returned at 31 stations having an aggregate average annual strength of 2,141 men.

TABLES relating to the CONTAGIOUS DISEASES ACTS, as regards the ARMY, contrasting the Results at 28 Large Stations in the United Kingdom, being all at which the Force was 500 Men and upwards, when the first Act was applied.

I.—TABLES showing the Admissions into Hospital for Primary Venereal Sores and for Gonorrhœa at 28 Stations of Troops in the United Kingdom, from 1860.

Year.	The Fourteen Stations successively brought under the Acts.					Fourteen Large Stations not under the Acts.				
	Average Annual Strength.	Admissions into Hospital for Primary Venereal Sores.	Admissions into Hospital from Gonorrhœa.	Ratio per 1,000 of the Strength. Primary Venereal Sores.	Ratio per 1,000 of the Strength. Gonorrhœa.	Average Annual Strength.	Admissions into Hospital for Primary Venereal Sores.	Admissions into Hospital from Gonorrhœa.	Ratio per 1,000 of the Strength. Primary Venereal Sores.	Ratio per 1,000 of the Strength. Gonorrhœa.
1860 - - -	57,479	8,405	7,966	146	139	17,118	2,292	2,374	134	139
1861 - - -	51,328	7,207	7,133	142	139	17,126	2,049	2,023	120	118
1862 - - -	45,822	5,314	6,283	117	139	15,026	1,500	2,070	100	138
1863 - - -	43,419	4,653	5,202	107	120	15,132	1,612	1,816	107	120
Totals for 4 years -	197,548	25,639	26,584	—	—	64,402	7,453	8,283	—	—
Average for 1860–63 -	49,387	6,410	6,646	130	135	16,100	1,863	2,071	116	129
1864 - - -	40,694	4,135	4,803	102	118	14,894	1,647	1,636	111	110
1865 - - -	43,078	4,077	4,937	95	115	14,091	1,418	1,968	101	140
1866 - - -	39,476	3,444	4,573	87	116	14,595	1,154	1,663	79	114
1867 - - -	39,911	3,640	5,274	91	132	20,589	2,372	2,670	115	130
1868 - - -	42,595	3,533	5,685	83	133	19,486	2,130	2,236	109	115
1869 - - -	42,017	2,765	4,466	66	106	17,739	2,273	1,856	128	105
Totals for 6 years -	247,771	21,594	29,738	—	—	101,394	10,994	12,029	—	—
Average for 1864–69 -	41,295	3,599	4,956	87	120	16,899	1,832	2,005	108	119
1870 - - -	41,580	2,268	4,081	55	98	17,852	2,022	1,723	113	96
1871 - - -	54,096	2,763	6,254	51	116	19,957	1,865	2,137	93	107
1872 - - -	50,794	2,752	5,280	54	104	19,950	2,457	2,113	123	106
1873 - - -	48,039	2,420	3,946	50	82	19,801	2,025	1,888	102	95
1874 - - -	48,136	2,039	2,968	42	62	18,879	1,661	1,460	88	77
1875 - - -	48,606	1,717	2,825	35	58	19,573	1,552	1,405	79	72
1876 - - -	48,620	1,622	3,302	33	68	18,790	1,554	1,677	82	89
1877 - - -	52,422	1,809	3,585	35	68	19,076	1,730	2,234	91	117
1878 - - -	55,813	2,235	4,352	40	78	20,749	2,723	2,508	131	121
Totals for 9 years -	448,106	19,625	36,593	—	—	174,627	17,589	17,135	—	—
Average for 1870–78 -	49,790	2,181	4,066	44	82	19,403	1,954	1,904	101	98

N.B.—For the years 1860–66, inclusive, Windsor has been omitted from the group of stations under the Act, and London from that *not* under the Act, as the returns for those years do not afford the necessary information. *United Kingdom.*

II.—TABLES showing the Number of Men always in Hospital with Primary Venereal Sores at 28 Stations, for Troops in the United Kingdom, in each Year, from 1870 to 1878, inclusive.

Year.	Under the Act.			Not under the Act.		
	Average Annual Strength.	Constantly in Hospital with Primary Venereal Sores.	Ratio per 1,000 of the Strength.	Average Annual Strength.	Constantly in Hospital with Primary Venereal Sores.	Ratio per 1,000 of the Strength.
1870	41,580	186	4·46	17,852	174	9·74
1871	54,096	210	3·89	19,957	161	8·07
1872	50,794	232	4·56	19,950	225	11·29
1873	48,039	214	4·45	19,801	175	8·86
1874	48,136	150	3·11	18,879	130	6·89
1875	48,606	129	2·66	19,573	115	5·88
1876	48,620	120	2·47	18,790	112	5·94
1877	52,422	137	2·61	19,076	119	6·23
1878	55,813	175	3·14	20,749	185	8·90
Total	448,106	1,553	—	174,627	1,396	—
Average for 9 years	49,790	173	3·47	19,403	155	7·99

For the four years (1860–63) preceding that in which the first Contagious Diseases Act was passed, the average rate of prevalence of primary venereal sores at a group of stations, each of which was successively placed under the Act, is 130, and that for gonorrhœa is 135 per 1,000 of the strength. At another group of 14 stations (originally selected for comparison because at the time the stations comprised in it were large ones, that is, had not less than 500 men) the rate of prevalence of primary venereal sores is 116, and that for gonorrhœa is 129 per 1,000 of the strength.

In the next period shown (1864–69) the Act was applied successively at each of the stations in the subjected group; in 1865 it was in operation at three stations, in 1866 at four, in 1867 at five, in 1868 at eight, in 1869 at 10, in 1870 it was in operation at all the 14 stations. During this period the average rate of prevalence of primary venereal sores fell to 87 per 1,000 of the strength, in the subjected group; in the contrasted group of large stations it fell to 108 per 1,000 of the strength. The result, therefore, is that the subjected group of stations which before the application of the Act had a rate of prevalence 14 per 1,000 higher than the unsubjected group, for the period of its partial application, has a rate of prevalence 21 per 1,000 lower than that of the unsubjected group.

In the third period shown (1870–78) the Act was in force for the whole time at every one of the stations in the subjected group, and the average rate of prevalence of the disease fell to 44 per 1,000 men, an average rate identical with that for the period 1870 to 1877: at the unsubjected group the rate fell to 101 per 1,000 men, an average rate higher, however, by 4 per 1,000 men than that for the period from 1870 to 1877.

The rate of prevalence of gonorrhœa in the first years of the application of the Act did not materially differ in the two groups of stations; in the last years, however, the results are favourable for the subjected group, the rate of which in 1878, is more than a third lower than that of the unsubjected one.

In Table II. the average number of men always in hospital on account of primary venereal sores at each of the groups of stations for the years 1870–78 is shown. The average rate of the subjected group is less than the half of that of the other.

Scrofula and Phthisis.—Compared with the preceding year the rate of admissions is lower for the Northern District by 4·2 per 1,000 men, for the Western by 2·5, for the Southern by ·4, for the South-eastern by 1·2, for the

United Kingdom.

Home by 4, for the Woolwich by 1·6, for the Channel Islands by 2·1, and for the Belfast by 2·3; it is higher for the Eastern District by 4, for the Chatham by 5·5, for the Aldershot by ·7, for the North British by 1·5, and for the Dublin by 1·4; the rate for the Cork District is the same in both years.

LOCAL DISEASES.—*Diseases of the Nervous System.*—Compared with 1877 the rate of admissions is lower for the Northern District, the Western, the Southern, the Chatham, the Aldershot, the North British, the Channel Isles, the Belfast, and the Cork, and higher for each of the other districts.

Diseases of the Eye.—For all districts together the rate of admissions is fractionally higher than in the preceding year. The rate is highest for the Eastern District and lowest for the Channel Islands, in the preceding year the rate was highest for the Channel Islands and lowest for the Home District.

Diseases of the Circulatory System.—For all districts together the rate is 2·8 per 1,000 of the strength higher than that for the preceding year. It is higher than that for last year for the Northern, the Eastern, the Western, the Southern, the Chatham, the South-eastern, the Home, the Woolwich, the North British, the Channel Islands, and the Cork Districts; and lower for Aldershot, Belfast, and Dublin.

Diseases of the Respiratory System.—The rate of admissions for the United Kingdom is in the aggregate 10·1 per 1,000 men lower than that for the preceding year. The rates range from 124·7 for the Channel Islands, which is the highest; to 46 for the Belfast District, which is the lowest; they are higher for the Eastern, Southern, Chatham, and Channel Islands Districts than in 1877, and lower for all others.

Diseases of the Digestive System.—The rate of admissions for all districts together is 3·2 per 1,000 men lower than that for 1877, the lowest rate is given by the Belfast District, which is 74·2, and the highest by the Eastern, which is 148·8. These diseases were less prevalent than in the last year in the Eastern, the Northern, the South-eastern, the Home, the Aldershot, the North British, the Channel Islands, the Belfast, the Dublin, and the Cork Districts, but more so in the others.

Diseases of the Urinary System.—The rate of admissions for the United Kingdom is in the aggregate 7·1 per 1,000 men higher than that for the preceding year. It is lower for the Southern, Channel Islands, and Dublin Districts than last year, but higher for all others.

The admissions into hospital for gonorrhœa, at specified groups of stations in the United Kingdom, are shown in the following Table:—

Groups.	Average Annual Strength of the Group.	Admissions into Hospital for Gonorrhœa.	Ratio per 1,000 of the Strength of Admissions for Gonorrhœa.
The 14 stations under the Contagious Diseases Act -	55,813	4,352	78
At 14 *large stations* not under the Contagious Diseases Act	20,749	2,508	121
All stations together not under the Contagious Diseases Act (excluding the 14 *large stations*) - - -	24,567	2,004	82

Diseases of the Cutaneous System.—For all districts together the rate of admissions is 3·3 per 1,000 of the strength higher than that for last year. The rates are lower for the Northern, Eastern, Chatham, Woolwich, and North British Districts, and higher for all others.

POISONS.—The rate of admissions is in the aggregate almost the same as in the preceding year. The highest rate is given by the Channel Islands, and is 8·7 per 1,000 of the strength. The lowest is for the Dublin District, which is ·8 only.

INJURIES.—The admission rate for accidental injuries is higher for the Southern, Home, Woolwich, and Cork Districts than in the preceding year, and lower for all others. *United Kingdom.*

Judicial.—The admissions under this head were confined to the Cork District, and were due to punishment by flogging in the Military Prison.

The following Table, compiled from the Principal Medical Officer's Returns, shows the admissions, deaths, and number of men invalided from each arm of the service, with the rates per 1,000 of the strength and the corresponding rates for the 10 years previous :—

Arms of the Service.	Average Strength.	Admitted into Hospital.	Died in and out of Hospital.	Discharged as Invalids.	Annual Ratio per 1,000 of Strength.			1868–77.—Annual Ratio per 1,000. of Strength.		
					Admitted.	Died.	Invalided.	Admitted.	Died.	Invalided.
Household Cavalry.	1,204	741	4	43	615·4	3·32	35·71	632·3	7·38	13·93
Cavalry - -	11,058	10,810	57	535	977·6	5·15	48·38	803·8	7·22	30·21
Royal Artillery	18,082	13,854	130	593	766·2	7·19	32·80	893·1	9·88	27·73
Royal Engineers	3,510	2,188	22	83	623·4	6·27	23·65	*641·2	6·98	16·58
Foot Guards -	6,034	5,969	37	188	989·2	6·16	31·16	752·4	7·86	21·93
Infantry Regiments, including Depôts.	46,723	38,158	295	1,656	816·7	6·31	35·44	732·2	7·92	26·27
Brigade Depôts -	9,799	7,377	103	342	752·8	10·51	34·90	†893·6	12·05	46·28
Garrison Staff and Departments.	4,999	3,037	38	88	607·5	7·60	17·60	*469·2	10·19	16·43

The admission rates for the Household Cavalry, the Cavalry, and the Garrison Staff and Departments are higher than in 1877, and those for the other arms are lower. In the Household Cavalry the rate is higher by 4·5 per 1,000 of the strength, in the cavalry by 90, and in the Garrison Staff and Departments by 138·3. In the Royal Artillery it is lower by 10·7, in the Royal Engineers by 17·8, in the Foot Guards by 27·1, in the infantry by 2, and in the Brigade Depôts by 71·1. The death rate shows a reduction for all arms except the Garrison Staff and Departments in which it is ·82 higher than in 1877. For the Household Cavalry there is a decrease of ·80, for the Cavalry of ·65, for the Royal Artillery of 1·57, for the Royal Engineers of 2·68, for the Foot Guards of ·34, for the Infantry Regiments of 1·19, and for the Brigade Depôts of ·17 per 1,000 men. Invaliding shows a lower rate for the Royal Engineers, the Infantry Regiments, and for the Garrison Staff and Departments than in the preceding year, but a higher for the other arms of the Service. For the Household Cavalry the increase is 22·52 per 1,000, for the Cavalry it is 10·53, for the Royal Artillery 6·41, for the Foot Guards, 6·25, and for the Brigade Depôts 9·49; the rate is lower for the Royal Engineers by 2·90, for the Infantry Regiments by ·33, and for the Staff and Departments by ·25 per 1,000.

In the following Table, to the strength of each arm one half of the number of men belonging to it who were placed on the pension list during the year

* Admissions for 1877 only.

† Includes a portion of the Depôts.

United Kingdom.

has been added, and to the mortality of the arm the deaths occurring before the 31st December among the men pensioned from it :—

	1878.			1868–77.
	Average Strength corrected as above.	Deaths of Soldiers and Pensioners.	Ratio of Deaths per 1,000 of the Strength.	Ratio of Deaths of Soldiers and Pensioners per 1,000 of the Strength.
Household Cavalry -	1,235	5	4·05	9·26
Cavalry - - -	11,437	68	5·95	7·99
Royal Artillery - -	18,527	156	8·42	10·00
Royal Engineers - -	3,607	25	6·93	—
Foot Guards - -	6,132	41	6·69	9·31
Infantry Regiments -	48,299	332	6·87	8·85
Brigade Depôts - -	9,934	107	10·77	—

Compared with the death rate of soldiers and pensioners for 1877 a decrease is observed in the mortality of the Cavalry, the Royal Artillery, the Foot Guards, and the Infantry, and an increase in the Household Cavalry. As the Royal Engineers and Brigade Depôts were not included in the Table published last year, no comparison can be made respecting them.

Vaccination.

The following Table shows the condition, as to vaccination, of recruits found fit for the service on primary inspection by Army Medical Officers. No information is available respecting those primarily inspected by Civil Medical Practitioners :—

	Number of Recruits found fit for the Service.	Ratio per 1,000
Had marks of vaccination - -	23,066	909·6
Had marks of small-pox - -	1,189	46·9
Had neither marks of vaccination nor small-pox - - - -	1,102	43·5
Total - -	25,357	1000·0

This table shows a considerable decrease in the proportion of recruits with small-pox marks when compared with the returns for 1877. There is a considerable increase in those who had neither marks of vaccination nor small-pox, and a trifling increase in the proportion of recruits with marks of vaccination.

The following Table, compiled from the Annual Returns, shows the number of soldiers vaccinated during the year, with the proportions per 1,000 of successful vaccinations and failures, when vaccinated with fresh or preserved lymph :—

	Fresh Lymph.		Preserved Lymph.	
	Number Vaccinated.	Ratio per 1,000	Number Vaccinated.	Ratio per 1,000
Number of perfect vesicles -	4,091	407·0	6,292	361·2
Number of modified vesicles -	4,199	417·8	5,827	334·5
Number of failures - -	1,761	175·2	5,301	304·3
Total - -	10,051	1000·0	17,420	1000·0

This table shows, when compared with last year's, a much larger proportion of modified vesicles and of failures in soldiers who were vaccinated with fresh lymph, and a smaller proportion of perfect vesicles. While in those vaccinated with preserved lymph the proportion of failures is less, that of perfect vesicles is much, and of modified vesicles a little greater. *United Kingdom.*

On the Influence of Age on the Mortality of the Troops serving in the United Kingdom.

The rates of mortality at different ages (arranged in quinquennial periods), in the several arms of the service, are shown in the following Table:—

Arms of the Service.	Annual Ratio of Deaths per 1,000 Living, at the following Ages:—					
	Under 20.	20 and under 25.	25 and under 30.	30 and under 35.	35 and under 40.	40 and upwards.
Household Cavalry	—	2·37	—	5·00	7·25	20·00
Cavalry	1·31	3·29	3·56	5·03	11·52	34·37
Royal Artillery	4·29	4·45	4·97	9·27	15·53	19·83
Royal Engineers	2·17	2·31	6·98	6·13	10·61	28·43
Foot Guards	2·63	5·98	4·07	4·85	10·53	39·74
Infantry (including Depôts)	3·25	4·51	5·75	9·58	10·92	18·87
Brigade Depôts	2·15	2·93	6·33	14·26	18·12	21·98
Garrison, Staff, and Departmental Corps.	1·99	5·49	6·84	7·81	15·62	14·39
Average of all Troops at Home	2·92	4·27	5·28	9·05	13·52	21·54
Ditto ditto 1868–77	3·09	5·42	7·89	12·52	17·92	24·12
*Civil Male Population { England and Wales	6·89	8·67	9·55	10·57	11·96	13·96
*Civil Male Population { Healthy Districts	5·83	7·30	7·93	8·36	8·90	9·86

On the Recruiting of the Army.

The number of recruits inspected during the year, as shown by the Annual Returns, was 43,867; of these 36,133 were examined by Army Medical Officers, and 7,734 by Civil Medical Practitioners. At their primary inspection 10,776 or 298·23 per 1,000 were rejected by Army Medical Officers, and 1,155 or 149·34 by Civil Medical Practitioners; on secondary inspection 1,160 more were found unfit, making the total number of rejections 13,091 or 298·42 per 1,000 of the number examined; the ratio of rejections being higher than in 1877 by 5·36 per 1,000.

The following Table shows the numbers inspected and rejected, and the ratios of rejections per 1,000 examined:—

Examined by	Number of Recruits Primarily Inspected.	Number Rejected			Ratio of Rejections per 1,000 Inspected.	
		On Primary Inspection.	On Secondary Inspection.	Total.	On Primary Inspection.	Both Primary and Secondary Inspection.
Army Medical Officers	36,133	10,776	1,160	13,091	298·23	298·42
Civil Medical Practitioners	7,734	1,155			149·34	
Total	43,867	11,931	1,160	13,091	271·98	298·42

* The ratio of mortality of males in the civil population under 20 has been calculated for the ages of 17-20, and that of 40 and upwards for the ages 40-45. The data for England and Wales have been obtained from Dr. Farr's English Life Table, published by authority of the Registrar General in 1864, and for Healthy Districts, from Dr. Farr's Healthy District Life Table, published in the 33rd Annual Report of the Registrar General.

United Kingdom.

The proportion of rejections by Army Medical Officers is within a small fraction of being the same as in the preceding year. The rejections by Civil Medical Practitioners is 10·12 per 1,000 less.

The native countries of recruits, the ratios of rejections, and the proportion per 1,000 furnished by each country, are given in the following Table:—

Native Countries of Recruits.	Examined by Army Medical Officers.		Examined by Civil Medical Practitioners.		Rejected on Secondary Inspection.	Total.		Proportion Rejected per 1,000 Inspected.	Proportion per 1,000 Recruits furnished by each Country.
	Inspected.	Rejected.	Inspected.	Rejected.		Primarily Inspected.	Rejected at Primary and Secondary Inspections.		
England and Wales	24,344	7,260	6,000	924	907	30,344	9,091	299·6	692
Scotland - -	3,734	1,187	526	110	88	4,260	1,385	325·1	97
Ireland - -	7,644	2,345	1,194	120	157	8,838	2,522	285·4	201
British Colonies and Foreign Countries -	411	84	14	1	8	425	93	218·8	10
Total -	36,133	10,776	7,734	1,155	1,160	43,867	13,091	298·4	1,000

The ratio of rejections for England and Wales is 9·2 per 1,000 higher than in 1876; for Scotland, 10·4 higher; for Ireland, 8·4 lower, and for British Colonies and Foreign Countries, 53·9 lower. England and Wales furnished a smaller, and Scotland, Ireland, and Foreign Countries a larger proportion of recruits than in the preceding year.

The following Table shows the number of recruits inspected for each arm of the service, the number rejected, the ratios of rejections, and the proportion per 1,000 inspected for each arm:—

Arms of the Service.	Examined by Army Medical Officers.		Examined by Civil Medical Practitioners.		Total Primary Inspections.		Rejected at Secondary Inspections.	Total Rejected at Primary and Secondary Inspections.	Ratio of Rejections per 1,000 of Recruits Inspected.	Proportion per 1,000 inspected for each Arm of the Service.
	Inspected.	Rejected.	Inspected.	Rejected.	Inspected.	Rejected.				
Household Cavalry -	274	89	—	—	274	89	—	89	327·2	6
Cavalry of the Line -	4,260	1,321	439	51	4,699	1,372	56	1,428	303·9	107
Royal Artillery -	5,517	1,629	857	114	6,374	1,743	120	1,863	292·1	145
Royal Engineers -	1,612	439	238	24	1,850	463	23	486	262·7	42
Foot Guards - -	533	186	1,023	234	1,556	420	226	646	415·2	36
Infantry Regiments -	23,024	6,882	5,175	732	28,199	7,614	732	8,346	296·0	643
Departmental Corps	913	230	2	—	915	230	3	233	254·6	21
Total - -	36,133	10,776	7,734	1,155	43,867	11,951	1,160	13,091	298·4	1,000

The proportion of rejections was lower for the Royal Engineers and Infantry, but higher for the other arms, than in the preceding year. The Foot Guards show the highest rate as in 1877. *United Kingdom.*

The occupations of recruits before enlistment, the proportions rejected, and furnished by each group, are shown in the following Table:—

Occupations of Recruits.	Number Inspected.	Number Rejected at Primary Inspection.	Number Rejected at Secondary Inspection.	Total Rejected.	Ratio per 1,000 Rejected.	Proportion per 1,000 furnished by each Group of Occupations.
1. Labourers, Servants, Husbandmen, &c.	26,545	7,071	735	7,806	294·1	605
2. Manufacturing Artisans (as Clothworkers, Weavers, Lace Makers, &c.).	4,315	1,260	104	1,364	316·1	98
3. Mechanics employed in Occupations favourable to physical development (as Smiths, Carpenters, Masons, &c.).	7,889	2,215	253	2,468	312·8	180
4. Shopmen and Clerks - -	3,752	1,105	55	1,160	309·2	86
5. Professional Occupations, Students, &c.	537	178	6	184	342·6	12
6. Boys under 17 years of age -	829	102	7	109	131·5	19
Total - - -	43,867	11,931	1,160	13,091	298·4	1,000

The proportion of rejections for each group, except No. 3 (mechanics), is higher than last year; No. 5 (professional occupations, &c.), shows the highest, and No. 6 (boys) the lowest ratio of rejections. The proportions per 1,000 furnished by Nos. 1 and 2 are lower, and those by the other groups higher than in 1877.

The state of education of recruits primarily inspected by Army Medical Officers is shown in the following Table. There is no information available on this head respecting those examined by Civil Medical Practitioners:

——	Numbers Inspected.	Ratio per 1,000.
Unable to read - - - -	5,293	146·5
Able to read only - - - -	3,934	108·9
Able to read and write - - -	26,906	744·6
Total - - - -	36,133	1,000·0

The state of education as shown by this Table is less favourable than last year as regards the number of recruits "able to read and write," but there is an increase in the ratio of men "able to read only," and a decrease under the head of "unable to read."

United Kingdom.

Table showing the number of recruits rejected in 1878, with the causes of rejection arranged in classes, and the ratio per 1,000 in each class :—

Causes of Rejections, in Classes.	Recruits Rejected on Primary Inspection.						Rejections on Secondary Inspection.	Total Rejections on Primary and Secondary Inspections.	
	Examined by Army Medical Officers.		Examined by Civil Medical Practitioners.		Total.				
Numbers inspected	36,133		7,734		43,867			43,867	
	Numbers Rejected.	Ratio per 1,000 Rejected.	Numbers Rejected.	Ratio per 1,000 Rejected.	Numbers Rejected.	Ratio per 1,000 Rejected.		Numbers Rejected.	Ratio per 1,000 Rejected.
1. Syphilis	509	14·09	77	9·96	586	13·36	79	665	15·16
2. Scrofula	212	5·87	13	1·68	225	5·13	17	242	5·52
3. Phthisis	211	5·84	44	5·69	255	5·81	35	290	6·61
4. Impaired Constitution	381	10·54	21	2·71	402	9·16	66	468	10·67
5. Muscular Tenuity and Debility.	1,652	45·72	90	11·64	1,742	39·71	93	1,835	41·83
6. Other General Diseases	87	2·41	10	1·29	97	2·21	4	101	2·30
7. Diseases of Nervous System.	58	1·61	3	·39	61	1·39	6	67	1·53
8. Weakness of Intellect	73	2·02	2	·26	75	1·71	7	82	1·87
9. Defective Vision	1,858	51·42	173	22·37	2,031	46·30	156	2,187	49·85
10. Diseases of Eyes and Eyelids.	112	3·10	11	1·42	123	2·80	12	135	3·08
11. Diseases of Nose and Mouth.	48	1·33	3	·39	51	1·16	3	54	1·23
12. Diseases of Ears	12	·31	1	·13	13	·30	2	15	·34
13. Deafness	105	2·91	2	·26	107	2·44	7	114	2·60
14. Impediment of Speech	63	1·73	1	·13	63	1·44	4	67	1·53
15. Disease of Heart	771	21·34	115	14·87	886	20·20	151	1,037	23·64
16. Disease of Arteries (Aneurism).	20	·55	—	—	20	·46	—	20	·46
17. Diseases of Veins (Varix).	625	17·30	99	12·80	724	16·50	64	788	17·96
18. Diseases of Lungs (except Phthisis).	145	4·01	15	1·94	160	3·65	4	164	3·74
19. Loss or Decay of many Teeth.	377	10·44	12	1·55	389	8·87	32	421	9·60
20. Hernia	341	9·44	98	12·67	439	10·01	47	486	11·08
21. Laxity of Abdominal Rings.	241	6·67	5	·65	246	5·61	10	256	5·84
22. Hæmorrhoids	207	5·73	14	1·81	221	5·04	9	230	5·24
23. Diseases of Urinary Organs.	42	1·16	8	1·03	50	1·14	2	52	1·18
24. Varicocele	434	12·01	97	12·54	531	12·11	43	574	13·08
25. Other Diseases of Genital Organs (not Syphilitic).	70	1·94	5	·65	75	1·71	10	85	1·94
26. Defects of Upper Extremities, from Fracture, Contraction, Luxation, &c.	249	6·89	20	2·59	269	6·13	56	325	7·41
27. Defects of Lower Extremities, from Fracture, Contraction, Luxation, &c.	468	12·95	52	6·72	520	11·85	78	598	13·63
28. Flat Feet	245	6·78	16	2·07	261	5·95	33	294	6·70
29. Diseases of Joints	85	2·35	14	1·81	99	2·26	9	108	2·46
30. Other Affections of Bones and Muscles.	143	3·96	5	·65	148	3·37	8	156	3·56
31. Ulcers, Wounds, and Cicatrices.	238	6·59	23	2·97	261	5·95	26	287	6·54
32. Other Affections of the Cutaneous System.	169	4·68	23	2·97	192	4·38	20	212	4·83
33. Malformation of Ears	2	·06	—	—	2	·05	—	2	·05
34. Malformation of Nose and Mouth.	7	·19	—	—	7	·16	—	7	·16
35. Malformation of Chest and Spine.	403	11·15	72	9·31	475	10·82	50	525	11·97
36. Malformation of Urinary or Genital Organs.	35	·97	2	·26	37	·84	2	39	·89
37. Marks of Punishment, or letter D. or B.C.	16	·44	—	—	16	·36	6	22	·50
38. Marks of Cupping, Blistering, &c.	63	1·74	1	·13	64	1·46	9	73	1·66
39. Not recorded	—	—	8	1·03	8	·18	—	8	·18
Total Rejected	10,776	298·23	1,155	149·34	11,931	271·98	1,160	13,091	298·42

Syphilis, impaired constitution, muscular tenuity and debility, defective vision, diseases of the heart, diseases of the veins, hernia, varicocele, defects of the lower extremities, and malformation of the chest and spine, were the principal causes for rejection. *United Kingdom.*

The proportion rejected for each class differs but little from last year.

Ages, Heights, and Weights of Recruits.

Table showing the ages of all recruits, as given at their primary inspection, and the proportion per 10,000 at each age:—

Ages.	Numbers Inspected.			Proportion in 10,000.		
	By Army Medical Officers.	By Civil Medical Practitioners.	Total.	Inspected by Army Medical Officers.	Inspected by Civil Medical Practitioners.	Total.
Boys under 17 years	791	38	829	219	49	189
From 17 to 18 „	1,211	90	1,301	335	116	297
„ 18 to 19 „	7,803	1,824	9,627	2,162	2,358	2,196
„ 19 to 20 „	7,425	1,415	8,840	2,057	1,830	2,017
„ 20 to 21 „	4,628	1,145	5,773	1,282	1,481	1,314
„ 21 to 22 „	4,171	901	5,072	1,156	1,165	1,157
„ 22 to 23 „	3,524	756	4,280	976	978	976
„ 23 to 24 „	2,630	679	3,309	729	878	755
„ 24 to 25 „	2,879	793	3,672	798	1,025	842
25 years and upwards	1,033	93	1,126	286	120	257
Total -	36,095*	7,784	43,829*	10,000	10,000	10,000

The proportion of recruits from 18 to 19, from 24 to 25, and upwards of 25 years is lower than last year, but higher for all the other ages in the table.

Table showing the heights of all recruits, taken at their primary inspection, and the proportion per 10,000 at each height:—

Heights.	Numbers Inspected.			Proportion per 10,000.		
	By Army Medical Officers.	By Civil Medical Practitioners.	Total.	Inspected by Army Medical Officers.	Inspected by Civil Medical Practitioners.	Total.
ft. in. ft. in.						
Under 5 3 -	732	35	767	203	45	175
5 3 to 5 4 -	725	10	735	201	13	168
5 4 to 5 5 -	3,642	223	3,865	1,009	288	882
5 5 to 5 6 -	9,302	1,784	11,086	2,577	2,307	2,529
5 6 to 5 7 -	8,221	1,868	10,089	2,278	2,415	2,302
5 7 to 5 8 -	6,307	1,574	7,881	1,747	2,035	1,798
5 8 to 5 9 -	3,706	1,184	4,890	1,027	1,531	1,116
5 9 to 5 10 -	1,950	638	2,588	540	825	591
5 10 to 5 11 -	838	250	1,088	232	323	248
5 11 to 6 0 -	393	112	505	109	145	115
6 0 and upwards	279	56	335	77	73	76
Total -	36,095*	7,734	43,829*	10,000	10,000	10,000

* The totals differ from the general total, owing to the omission of the information required for these tables, in the case of 38 recruits found unfit for the service at Beverley.

United Kingdom.

When compared with the Table for 1877 containing this information, a great decrease is observed in the proportion of recruits from 5 ft. 4 in. to 5 ft. 5 in., and there is a small decrease in the proportion of those from 5 ft. 10 in. to 5 ft. 11 in., and from 5 ft. 11 in. to 6 ft., while there is an increase in each of the other heights the greatest being in those of from 5 ft. 5 in. to 5 ft. 6 in. There were 450 per 10,000 more recruits measuring upwards of 5 ft. 6 in. than last year.

Table showing the weights of recruits inspected by Army Medical Officers, and the proportion per 10,000 at each weight. There is no information of this kind available respecting those primarily inspected by Civil Medical Practitioners, or by Army Medical Officers at many of the smaller stations.

Weights.	Numbers Weighed.	Proportion per 10,000.
Under 100 lbs. - - - -	448	210
100 lbs. to 110 lbs. - - - -	283	133
110 „ to 120 „ - - - -	2,370	1,109
120 „ to 130 „ - - - -	5,632	2,636
130 „ to 140 „ - - - -	5,914	2,769
140 „ to 150 „ - - - -	4,016	1,880
150 „ to 160 „ - - - -	1,680	786
160 „ to 170 „ - - - -	714	334
170 „ and upwards - - -	305	143
Total - - - -	21,362	10,000

A smaller proportion of recruits weighed under 130 lbs. than in 1877 by 144 per 10,000. The decrease occurs entirely among those weighing between 110 lbs. and 120 lbs., and 120 lbs. and 130 lbs. Of the recruits weighing more than 130 lbs. there is a slight increase in all the weights, except in those of from 130 lbs. to 140 lbs., where there is a small decrease.

The Reserve Forces.

The Reserve Forces were called out for duty in April of this year. By returns received from the Principal Medical Officers of the various districts in the United Kingdom, it would appear that 17,907 men belonging to the Army Reserve and 18,812 belonging to the Militia Reserve, making a total of 36,719 presented themselves for medical examination previous to joining. Of the former 652 or 36·41 per 1000 were found unfit for general service, and of the latter 760 or 40·40 per 1000 were rejected. The total number of rejections, therefore, was 1,412 or 38·45 per 1,000 examined.

The following table compiled from the Principal Medical Officers' returns, shows the causes of rejection by classes, with the ratios of rejections for each class per 1,000 examined. *United Kingdom.*

Orders.	Diseases.	Army Reserve. Number rejected.	Army Reserve. Ratio per 1,000 rejected.	Militia Reserve. Number rejected.	Militia Reserve. Ratio per 1,000 rejected.	Total. Number rejected.	Total. Ratio per 1,000 rejected.
	Number examined - -	17,907.		18,812		36,719	
	I.—*General Diseases.*						
1	Sub-division A. - -	—	—	1	·05	1	·03
2	„ B. - -	101	5·64	84	4·47	185	5·04
	II.—*Local Diseases.*						
	Diseases of the—						
1	Nervous System -	16	·89	20	1·06	36	·98
2	Eye - - -	44	2·46	65	3·46	109	2·97
3	Ear - - -	8	·45	6	·32	14	·38
5	Circulatory System -	155	8·66	175	9·30	330	8·99
6	Absorbent „ -	2	·11	—	—	2	·06
8	Respiratory „ -	24	1·34	33	1·75	57	1·55
9	Digestive „ -	116	6·48	67	3·56	183	4·98
10	Urinary „ -	11	·61	6	·32	17	·46
11	Generative „ -	12	·67	16	·85	28	·76
12	Organs of Locomotion -	13	·73	44	2·34	57	1·55
13	Cellular Tissue - -	—	—	1	·05	1	·03
14	Cutaneous System -	17	·95	40	2·13	57	1·55
	III.—*Conditions, &c.*						
	Debility - - -	82	4·58	98	5·21	180	4·90
	IV.—*Poisons.*	2	·11	—	—	2	·06
	V.—*Injuries.*						
3	Accidents, &c. - -	35	1·95	73	3·88	108	2·94
6	Punishment - -	—	—	3	·16	3	·08
	VI.—*No Record.*	14	·78	28	1·49	42	1·14
	Total - -	652	36·41	760	40·40	1,412	38·45

CLASS I. GENERAL DISEASES.—*Sub-division A.*—One man was rejected for malarial fever or its effects.

Sub-division B.—Constitutional Diseases caused the rejection of 185 men or 5·04 per 1,000 of the number inspected. Of the rejections in this class 40 or 216·2 per 1,000 were for rheumatism in its various forms, 46 or 248·7 for syphilis, 5 or 27·0 for scrofula, 77 or 416·2 for phthisis, and 17 or 91·7 for various other diseases.

CLASS II. LOCAL DISEASES.—*Diseases of the Nervous System.*—In this order there were 36 rejections or ·98 per 1,000 of those inspected. Epilepsy caused the rejection of 16, insanity in its various forms 7, paralysis 7, and the remaining 6 were rejected for various other causes.

Diseases of the Eye.—There were 109 rejections in this order, of which 82 or 752·2 per 1,000 were for impaired vision and short sight.

Diseases of the Ear.—The rejections in this order were 14 in number, or in the proportion of ·38 per 1,000 of those examined. All the rejections, but one, were for deafness.

United Kingdom.

Diseases of the Circulatory System.—This order shows the highest rate of rejections, viz., 330 or 8·99 per 1,000 of the total number inspected. Valvular disease of the heart caused 135 or 409·1 per 1,000 of the rejections. Palpitation 30 or 90·9 per 1,000. Hypertrophy of the heart 6 or 18·2. Aneurism 4 or 12·1; varicose veins 152 or 460·6 and other affections 3 or 9·1.

Diseases of the Absorbent System.—There were two rejections only in this order.

Diseases of the Respiratory System.—The rejections in this order were 57 in number or 1·55 of those examined. Of the rejections 42 or 736·8 per 1,000 were for bronchitis.

Diseases of the Digestive System.—The number of rejections in this order was 183 or 4·98 per 1,000 of those inspected. To hernia 143 or 781·4 per 1,000 of the rejections were due, to diseases of the liver 19 or 103·8, to hæmorrhoids 6 or 32·8, to dysentery 6 or 32·8, and to other causes 9 or 49·18.

Diseases of the Urinary System.—Of 17 rejections in this order 10 or 588·2 per 1,000 were due to stricture of the Urethra.

Diseases of the Generative System.—There were 28 rejections in this order, or ·76 per 1,000 of the men inspected. Varicocele caused 9 or 321·4 per 1,000 of the rejections, orchitis the same number, and hydrocele 4 or 142·9, the remainder were for various causes.

Diseases of the Organs of Locomotion.—In this order there were 57 rejections or 1·55 per 1,000 of those examined. Of the rejections 5 or 87·7 per 1,000 were for diseases affecting the upper extremities, 11 or 193·0 for those of the lower extremities, 8 or 140·4 for acute synovitis and dropsy of the joints, 5 or 87·7 for ankylosis, 7 or 122·8 for disease of the spine, 7 or 122·8 for diseases affecting the muscles, 5 or 87·7 were reported lame, and 9 or 157·9 were found unfit from various other causes.

Diseases of the Cellular Tissue.—There was one rejection for abscess.

Diseases of the Cutaneous System.—Of 57 rejections, 44 or 771·9 per 1,000 were for ulcers.

Class III.—*Conditions.*—There were 180 rejections for debility, or 4·90 per 1,000 of those examined.

Class IV.—*Poisons.*—Four men were rejected bearing traces of lead poisoning.

Class V.—*Injuries.*—In all there were 108 rejections for the effects of accidents of various kinds, being in the proportion of 2·94 per 1,000 of the men examined.

To injuries to the head	- - - -	10, or	92·6
„ „ eye	- - - -	1, or	9·3
„ „ spine	- - - -	3, or	27·8
„ „ upper extremities	- - -	21, or	194·5
„ „ lower extremities	- - -	14, or	129·6
To fractures (particulars in most instances not stated)		40, or	370·3
To dislocations (joints not stated)	- - -	4, or	37·0
To gunshot wounds	- - - -	2, or	18·5
To other wounds (nature not stated)	- - -	6, or	55·6
To burns and scalds	- - - -	4, or	37·0
To sprains	- - - - -	3, or	27·8

per 1,000 of the rejections were due.

Punishment.—There were three rejections of men who bore marks of punishment.

III.—ON THE HEALTH OF THE TROOPS SERVING IN THE MEDITERRANEAN.

Section I.—*Sickness and Mortality.*

I.—GIBRALTAR.

STATISTICAL REPORT.

Gibraltar.

In an average strength of 4,702 non-commissioned officers and men, there were 3,157 admissions into hospital, 31 deaths (inclusive of 6 invalids who died subsequent to their arrival in England), and 175 men were constantly sick. The rate per 1,000 of the strength is for the admissions, 671·4, for the deaths, 6·59, and for the constantly sick, 37·22. Compared with 1877 the admission rate is 8·1 per 1,000 men higher, while those for the deaths, and for the constantly sick are, respectively, 1·54 and 2·33 per 1,000 lower.

The following changes occurred in the garrison. The 25th Company of Royal Engineers left for Bermuda, and was replaced by the 10th Company from that station. The 69th Regiment left for England in November, the 42nd and 71st Regiments arrived from Cyprus on the 29th of November and 26th of December, respectively, and a draught of the 46th Regiment arrived from England on the 12th October, and left for Bermuda on the 22nd of the same month.

The following table, taken from the Principal Medical Officer's Report, gives some of the most important of the health statistics of the various corps stationed in this Command.

Corps.	Completed Years of Service in the Command.	Average Annual Strength.	Admissions into Hospital.	Died.			Invalids sent Home.	Average Number constantly Sick.	Ratio per 1,000 of the Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.
				At Gibraltar.	Of Invalids.	Total.			Admissions.	Deaths.	Invalided.	Constantly Sick.		
Royal Artillery	4	970	626	4	—	4	78	48·93	645·4	4·12	80·41	49·48	18·08	29·13
Royal Engineers.	—	348	227	4	1	5	18	15·32	663·7	14·58	52·63	43·56	13·45	20·26
1/4th Foot -	4	687	348	6	1	7	31	19·66	507·3	10·19	45·18	27·69	10·46	20·21
2/23rd „ -	4	620	372	5	1	6	36	23·46	600·0	9·68	58·06	37·09	14·11	23·51
42nd „ -	—	70	392	—	—	—	—	11·31	5600·0	—	—	157·14	4·84	11·04
46th „ -	—	7	9	—	—	—	—	·12	1285·7	—	—	12·14	6·14	4·77
69th „ -	5	556	261	3	—	3	12	13·49	496·4	5·40	21·58	23·38	9·19	19·57
71st „ -	—	16	51	—	—	—	—	·43	3187·5	—	—	26·87	10·25	5·18
102nd „ -	2	680	530	1	1	2	32	24·32	779·4	2·94	47·06	35·30	13·06	16·75
2nd Battalion Rifle Brigade.	4	638	274	2	1	3	21	14·80	429·5	4·70	32·92	21·94	8·30	18·92
Army Service Corps.	—	62	32	—	—	—	4	1·69	586·3	8·77	52·63	33·33	12·17	20·70
Army Hospital Corps.	—	44	35	—	1	1	6	2·11						
Garrison Staff -	—	8	—	—	—	—	—	—						

Of the corps which were stationed in the Command for the whole year, the detachment of the Army Hospital Corps and the 102nd Regiment show the

Gibraltar.

highest proportion of admissions, in none of the others is the admission rate greatly above the average. The death rate for the Royal Engineers was high, and for the 1st Battalion of the 4th and the 2nd Battalion of the 23rd it was a little over the average. The admission rate for the 42nd Regiment, for the short period (five weeks) it was quartered in the Command, was excessive, owing chiefly to relapses of paroxysmal fevers contracted in Cyprus. The 71st also shows a very high admission rate. There were no deaths in either Regiment.

The classes and orders of diseases by which the sickness and mortality of the Command were caused, are shown in the following Table :—

Orders.	Diseases.	Strength, 4,702.				1878.		1869–77.	
		Admitted into Hospital.	Deaths.			Annual Ratio per 1,000.		Annual Ratio per 1,000.	
			At Gibraltar.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	I.—*General Diseases.*								
1	Febrile Group	870	7	—	7	185·0	1·49	95·9	1·57
2	Constitutional Group	492	2	5	7	104·6	1·49	108·1	1·67
	II.—*Local Diseases.*								
	Diseases of the—								
1	Nervous System	31	1	—	1	6·6	·21	7·1	·20
2	Eye	54	—	—	—	11·5	—	16·9	—
3	Ear	24	—	—	—	5·1	—	4·0	—
4	Nose	2	—	—	—	·4	—	·6	—
5	Circulatory System	36	6	—	6	7·7	1·28	11·1	1·03
6	Absorbent „	38	—	—	—	8·1	—	4·6	—
7	Ductless glands	—	—	—	—	—	—	·1	—
8	Respiratory System	226	1	—	1	48·1	·21	44·5	·71
9	Digestive „	318	—	1	1	67·6	·21	83·8	·20
10	Urinary „	232	—	—	—	49·4	—	62·1	·30
11	Generative „	53	—	—	—	11·3	—	13·8	—
12	Organs of Locomotion	37	—	—	—	7·9	—	5·0	·05
13	Cellular Tissue	96	—	—	—	20·4	—	14·5	—
14	Cutaneous System	160	—	—	—	34·0	—	55·6	—
	III.—*Conditions, &c.*								
	Debility	71	—	—	—	15·1	—	9·3	—
	IV.—*Poisons*	88	2	—	2	18·7	·42	9·5	·17
	V.—*Injuries.*								
1	Accidental	323	3	—	3	68·7	·64	92·1	·49
2	Self-inflicted	1	3	—	3	·2	·64	} ·2	·15
3	Judicial	—	—	—	—	—	—		
	VI.—*Surgical Operations*	3	—	—	—	·6	—	·2	·03
	No appreciable disease	2	—	—	—	·4	—	1·1	—
	Total	3,157	25	6	31	671·4	6·59	640·1	6·57
	Average of 10 years, 1868–77	—	—	—	—	657·4	6·76	—	—

General Diseases.—The admission rate for this class is 74·7 per 1,000 men in excess of last year's rate. This increase occurs entirely in the *febrile group* for which the rate is 81·7 higher than in 1877, while that for the *constitutional group* is 7·0 lower. The mortality rate is, however, lower by 1·25 per 1,000 of the strength. For the former group the decrease amounts to ·43, and for the latter to 1·50. *Gibraltar.*

The admissions and deaths for the principal diseases in this class are shown in the following Table:—

Diseases.	1878.		Annual Ratio per 1,000 of the Strength.			
			1878.		1869–77.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Febrile Group.						
Eruptive Fevers -	5	1	1·1	·21	2·2	·07
Continued „ - -	455	5	96·7	1·07	75·3	1·23
Paroxysmal Fevers -	405	1	86·1	·21	14·0	·22
Influenza - -	—	—	—	—	1·6	—
Erysipelas - -	5	—	1·1	—	2·0	—
Other Diseases - -	—	—	—	—	·8	·05
Total -	870	7	185·0	1·49	95·9	1·57
Constitutional Group.						
Rheumatism - -	283	—	60·2	—	47·2	·07
Syphilis - - -	162	—	34·5	—	50·8	·03
Scrofula, Phthisis, &c. -	48	7	9·1	1·49	8·0	1·50
Scurvy and Purpura -	1	—	·2	—	·1	—
Anæmia - -	1	—	·2	—	1·4	—
Other Diseases - -	2	—	·4	—	·6	·07
Total -	492	7	104·6	1·49	108·1	1·67

Eruptive Fevers.—There were three admissions for small-pox and two for measles, the death was from the former disease, which, at the time, was prevalent among the civil population and in the Spanish lines.

Continued Fevers.—The admission rate is 14·5 per 1,000 men higher than last year, the death rate, however, is ·21 per 1,000 lower. One death was from simple continued fever, the remainder were from enteric fever. The admissions for enteric fever were 18, for simple continued fever 251, and for febricula 186. Cases of the first of these diseases occurred in every season of the year, but were much more numerous in the latter than in the first half. In January there was 1 admission, in April 2, in June 1, in August 3, in September 2, in October 2, in November 3, and in December 4. The admissions were from the following corps:—The Royal Artillery 1, the 1st Battalion of the 4th Regiment 5, the 2nd Battalion of the 23rd 4, the 71st 2 (these cases were landed with the 71st Regiment on its arrival from Cyprus in December), the 102nd 2, the Rifle Brigade 3, and the Army Hospital Corps 1; and were furnished from the following barracks, &c.:—Windmill Hill 3, Europa 3, Buena Vista 4, Station Hospital 1, Casemate Barracks 2, North Front 1, Town Range 2, and the remaining 2 were landed from on board ship.

Paroxysmal Fevers.—The very high admission rate, when compared with former years, is due to the arrival of the 42nd Regiment from Cyprus in the last week of November and of the 71st in the last week of December; it is higher by 68·1 per 1,000 of the strength than in 1877. Remittent fever caused 62 of the admissions and 1 death; the 42nd and 71st Regiments

Gibraltar.

furnishing, respectively, 5 and 1 of the admissions; and the 1st Battalion of the 4th the death. Ague contributed the remainder of the cases in this group, viz., 343; all but 3 of these occurred in the corps from Cyprus, the 42nd Regiment being answerable for 311, the 71st for 25, the Army Service Corps for 1, and the Army Hospital Corps for 3. The medical officer in charge of the station hospital in writing of this disease states that it "assumed every "type of quotidian, tertian, and quartan forms, and was attended invariably "with pain and enlargement of the spleen. The attacks were mostly ushered "in by vomiting, and men were attacked on parade, on sentry, on fatigue, in "bed and out of bed, and at all times of the day and night. In some cases "the men had not suffered previously in Cyprus or elsewhere." The appearance of the men of the 42nd Regiment who were liable to attacks of this disease is described as one "of extreme malarial poisoning," while those of the 71st do not appear to have had "the same amount of malaria in their systems." In continuing the remarks furnished on the state of the former regiment, the medical officer writes, "from returns given me, I find 573 cases admitted into "hospital, while at Cyprus, 119 of these had served on the Gold Coast, that "one-fifth of the attacks of those who had served there were re-admitted once "or twice. The two companies (E. and G.) stationed at Papho (in Cyprus) "seem to have suffered most. The cases were more aggravated, some of them "presenting more of the remittent type, and as diarrhœa and even dysentery "were not uncommon among them, the consequent anæmia and debility "were more expressed." The two companies alluded to supplied 98 out of the 311 admissions from this regiment.

Erysipelas.—The admission rate is fractionally lower than in 1877.

Rheumatism, in its various forms, gives a higher admission rate by 2·3 per 1,000 of the strength than in the preceding year. Many of the cases were of an obstinate character, following attacks of "Mediterranean Fever."

Syphilis was less prevalent than in the preceding year, the admission rate is 10 per 1,000 men lower; there were 86 admissions for the primary form of the disease, and 76 for the secondary.

Scrofula and Phthisis.—Tubercular diseases give, fractionally, a higher admission rate than in 1877, but a lower mortality rate. Two of the deaths occurred in the Command, the remainder were those of invalids who died at Netley. Phthisis furnished 34 of the admissions, and hæmoptysis 9.

Local Diseases.—*Nervous System.*—The admission rate is nearly one-third lower than last year's. The principal diseases by which the admissions were caused were epilepsy 14, neuralgia 7, paralysis 4. The death was from epilepsy.

Diseases of the Eye were less prevalent than in 1877, conjunctivitis supplied 42 out of 54 admissions.

Diseases of the Circulatory System.—The admission rate for these diseases is little more than half that of last year, the death rate is, however, nearly double. Hypertrophy of the heart is credited with 21 admissions and 1 death, valvular disease with 9 of the former and 1 of the latter, rupture of the heart with 1 death, fatty degeneration with 1, and aneurism with 2 deaths.

Diseases of the Respiratory System.—The admission rate is 3·6, and the mortality rate ·22 per 1,000 of the strength lower than in 1877. Bronchitis was the cause of 190 of the admissions, pneumonia of 11, and pleurisy of 23. The fatal case was from the latter of these diseases.

Diseases of the Digestive System.—Compared with last year the admission rate is 22·2, and the death rate ·22 per 1,000 men lower. The diseases which contributed the greater numer of admissions were tonsillitis 88, dyspepsia 78, diarrhœa 60, hepatitis 23, hæmorrhoids 11, dysentery and colic each 10, jaundice 9, and tænia solium 9. The death was from abscess of the liver, and occurred at Netley in an invalid.

Diseases of the Urinary System.—The admissions are in the same proportion to the strength as for the preceding year, but there were no deaths. Gonorrhœa furnished 177 of the admissions, epididymitis 14, and stricture of the urethra 21.

Diseases of the Generative System.—There were 48 cases of orchitis and 5 of hydrocele admitted, giving an admission rate of 1·1 per 1,000 men lower than last year's.

Diseases of the Cellular Tissue give a higher admission rate by 4·6 per 1,000 of the strength than in 1877. The admissions were for inflammation of the cellular tissue 69, and for abscess 27.

Diseases of the Cutaneous System were a little more prevalent than in the preceding year. Of the cases, 43 were ulcers, 38 boils, 29 were of eczema, and 17 of itch.

CONDITIONS.—*Debility* gives an admission rate lower by 13·3 per 1,000 of the strength than in 1877.

POISONS.—The admission rate is identical with last year's. *Delirium Tremens* furnished 13 of the admissions and both the deaths, the remaining admissions were for alcoholic poisoning.

INJURIES.—*Accidents* give an admission rate of 23·5 and a death rate of ·22 per 1,000 of the strength below that of 1877. One death was from drowning, the others from multiple injury. Of the admissions, 134 were for contusions, 85 for wounds, and 81 for sprains. *Self-inflicted.*—There was 1 admission for cut-throat; 3 of the deaths were from hanging, 1 from gunshot wound, and 1 from multiple injury.

The Surgical Operations were amputation of the left leg for an accidental gunshot wound, amputation of the middle finger of the left hand, and the removal of a large exostosis from the index finger of the right hand.

Officers.

In an average annual strength of 155 officers, there were 107 attacks of illness, being in the rate of 690 per 1,000 of the strength; no death took place; 12 officers were invalided to England, being in the rate of 77·42 per 1,000. Simple continued fever furnished 6 of the cases of illness, febricula 21, remittent fever 7, and bronchitis 13.

Women.

In an average annual strength of 418 wives of non-commissioned officers and men there were 191 attacks of illness, and 7 deaths, being in the rates of 455 and of 16·74 per 1,000 of the strength, respectively; 45 of the illnesses were from diseases of the febrile group, and 34 from diseases of the digestive system. The deaths were due to remittent fever 2, phthisis 2, paralysis 1, peritonitis 1, and to abscess 1.

Children.

In an average annual strength of 915 children of non-commissioned officers and men there were 334 attacks of illness, and 52 deaths, being in the rates of 365 and of 56·83 per 1,000 of the strength respectively. Compared with the preceding year there is a lower rate of prevalence of sickness, but a death-rate higher by 23·64 per 1,000. The illnesses were due to chicken-pox in 4 instances, to measles in 27, to enteric fever in 7. The deaths were due to enteric fever (5), to remittent fever (2), to diphtheria (5), to tubercular diseases (3), to atrophy (2), to convulsions (7), to heart disease (1), to croup (4), teething (2), to bronchitis (1), to pneumonia (2), to diarrhœa (11), to premature birth (2), to abscess (1), and to burns and scalds (4).

Malta.

II.—MALTA.

STATISTICAL REPORT.

In an annual average strength of 6,201 non-commissioned officers and men, exclusive of the Royal Malta Fencible Artillery and the contingent of native troops from India, which was temporarily quartered in the Command, there were 5,537 admissions into hospital, 76 deaths (inclusive of nine invalids who died during their passage to, or after their arrival in this country), and the average daily sick in hospital was 308. The admission rate, therefore, is 892·9, that for the deaths, 12·26, and for the constantly sick, 49·67 per 1,000 of the strength. Compared with last year the admission rate is 4 per 1,000 of the strength lower, while the rates for the deaths and numbers constantly sick are, respectively, 3·98 and 3·77 higher.

The changes in the command were as follows:—The arrivals were M Battery, 1st Brigade, and F Battery, 2nd Brigade, Royal Artillery, and Madras and Bombay European Sappers and Miners, from India; the 12th Company, Royal Engineers, from Bermuda; and the 1st Battalion of the 1st, the 2nd of the 10th, and the 61st Regiments from England. The departures were M Battery, 1st Brigade, Royal Artillery, and the 2nd Battalions of the 2nd and 13th Regiments for India; F Battery, 2nd Brigade, Royal Artillery, the Madras and Bombay Sappers and Miners, and the 42nd, 71st, and 101st Regiments for Cyprus; and the 20th Company, Royal Engineers, for England.

The corps which served at Malta in the year, and some of the most important of their health statistics, are shown in the following Table:—

Corps.	Completed Years of Service in the Command.	Average Annual Strength.	Admissions into Hospital.	Died.			Invalids sent Home.	Average Number constantly sick.	Ratio per 1,000 of the Strength.				Average Sick-time to each Soldier.	Average duration of each case of Sickness.
				At Malta.	Of Invalids.	Total.			Admissions.	Deaths.	Invalided.	Constantly Sick.		
													Days	Days
10th Brigade, Roy. Artillery.	4	981	847	4	–	4	45	51·50	863·4	4·08	45·9	52·50	19·16	22·19
M Battery, 1st Brigade, Roy. Artillery.	—	54	60	3	1	4	5	2·61	788·8	54·05	67·6	35·27	12·87	15·84
F Battery, 2nd Brigade, Roy. Artillery.	—	20												
Royal Engineers.	—	203	142	5	–	5	1	6·09	699·5	24·63	4·9	30·00	10·95	15·65
1st Battalion, 1st Foot.	—	747	1,220	22	1	23	59	66·05	1633·0	30·79	78·9	88·42	32·27	19·76
2nd Battalion, 2nd Foot.	—	87	151	1	–	1	19	10·09	1735·6	11·49	218·3	115·97	42·33	24·39
2nd Battalion, 10th Foot.	—	271	315	4	–	4	—	11·31	1162·3	14·76	—	41·73	15·23	13·11
2nd Battalion, 13th Foot.	—	108	98	1	–	1	10	7·13	907·4	9·26	92·5	66·02	24·10	26·16
27th Foot -	2	802	695	5	1	6	48	36·61	866·6	7·48	59·8	45·65	16·66	19·23
42nd „ -	3	477	298	2	–	2	20	16·28	624·7	4·92	41·9	34·13	12·46	19·94
61st „ -	—	680	694	10	1	11	35	39·10	1020·6	16·18	51·4	57·37	20·99	20·56
71st „ -	5	441	288	1	–	1	24	17·04	653·0	2·27	54·4	38·64	14·10	21.60
98th „ -	3	763	433	4	2	6	17	24·64	593·1	7·86	22·2	32·29	11·79	20·77
101st „ -	3	465	261	2	2	4	19	17·12	261·2	8·58	40·8	36·82	13·44	23·94
Army Hospital Corps.	—	56	28	–	–	—	2	1·78	343·1	19·61	9·8	19·51	7·12	20·75
Army Service Corps.	—	11	4	1	1	2	—	·04						
Sappers and Miners.	—	3	3	–	–	—	—	·17						
Departmental Corps, &c.	—	32	—	–	–	—	—	—						

The corps which suffered most from sickness during the year were the 1st Battalion of the 1st, the 2nd Battalion of the 10th, and the 61st Regiments, all of which arrived in the Command early in the year. The diseases prevalent among them were chiefly fevers and diseases of the digestive system, and the mortality was caused principally by the former class. The 1st Battalion of the 1st Regiment was particularly unfortunate, losing no less than 20 men; 14 of the deaths in this Regiment were caused by enteric fever. *Malta.*

The sickness and deaths in each class and order of diseases are shown in the following Table :—

Order.	Diseases.	1878.—Average Annual Strength, 6,201.						1869–77.	
		Admitted.	Deaths. In Malta.	Deaths. Of Invalids.	Deaths. Total.	Annual Ratio per 1,000 of the Strength. Admitted.	Annual Ratio per 1,000 of the Strength. Died.	Annual Ratio per 1,000 of the Strength. Admitted.	Annual Ratio per 1,000 of the Strength. Died.
	I. *General Diseases.*								
1	Febrile Group	1,209	33	—	33	195·0	5·32	175·7	2·59
2	Constitutional Group	514	6	7	13	82·9	2·10	84·2	1·68
	II. *Local Diseases.*								
	Diseases of the—								
1	Nervous System	47	3	—	3	7·6	·48	11·5	·51
2	Eye	188	—	—	—	30·3	—	29·2	—
3	Ear	64	—	—	—	10·3	—	6·2	—
4	Nose	3	—	—	—	·5	—	·7	—
5	Circulatory System	102	4	—	4	16·4	·65	13·1	1·38
6	Absorbent „	24	—	—	—	3·9	—	5·0	—
7	Ductless Glands	2	—	—	—	·3	—	·1	—
8	Respiratory System	257	2	—	2	41·4	·32	43·0	·90
9	Digestive „	967	8	—	8	155·9	1·29	149·6	·97
10	Urinary „	323	2	2	4	52·1	·65	41·6	·14
11	Generative „	98	—	—	—	15·8	—	12·3	—
12	Organs of Locomotion	37	—	—	—	6·0	—	5·4	·05
13	Cellular Tissue	189	—	—	—	30·5	—	29·0	·07
14	Cutaneous System	432	—	—	—	69·7	—	68·3	—
	III. *Conditions.*								
	Debility	339	—	—	—	54·7	—	10·8	—
	IV. *Poisons*	15	—	—	—	2·4	—	9·4	·23
	V. *Injuries.*								
2	Accidental	720	8	—	8	116·1	1·29	107·7	·67
3	Homicidal	—	—	—	—	—	·16	·1	·02
4	Self-inflicted	2	1	—	1	·3	—	} ·7	·30
5	Judicial	—	—	—	—	—	—		
	VI. *Surgical Operations*	—	—	—	—	—	—	·2	·05
	No appreciable disease	5	—	—	—	·8	—	1·1	—
	Total	5,537	67	9	76	892·9	12·26	804·9	9·56
	Average of 10 years, 1868–77	—	—	—	—	810·5	10·60	—	—

Malta.

GENERAL DISEASES.—Diseases of this class were both more prevalent and more fatal than in 1877. The admission and death rates are higher by 44·3 and 3·46 per 1,000 of the strength, respectively. For the *febrile group*, the admission rate is in excess of last year's by 32·1, and that of the deaths by 3·16 per 1,000 men, and for the *constitutional group* the former is 12·2, and the latter ·30 higher.

The admissions for and deaths from the principal diseases in this class are shown in the following Table:—

General Diseases.	1878.		Annual Ratio per 1,000 of the Strength.			
			1878.		1869–77.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Febrile Group.						
Eruptive Fevers -	4	—	·6	—	2·4	·28
Continued „ - -	1,173	32	189·2	5·16	162·3	2·10
Yellow Fever - -	—	—	—	—	—	—
Paroxysmal Fevers -	27	1	4·4	·16	6·9	·14
Cholera - - -	—	—	—	—	—	—
Influenza - - -	3	—	·5	—	1·4	—
Erysipelas - -	2	—	·3	—	2·0	—
Other Diseases - -	—	—	—	—	·7	·07
Total - -	1,209	33	195·0	5·32	175·7	2·59
Constitutional Group.						
Rheumatism - -	301	—	48·5	—	50·4	—
Syphilis - - -	125	—	20·2	—	23·0	—
Scrofula, Phthisis, &c. -	76	13	12·3	2·10	9·1	1·48
Scurvy and Purpura -	2	—	·3	—	·2	·02
Anæmia - - -	3	—	·5	—	·9	—
Other Diseases - -	7	—	1·1	—	·6	·18
Total - -	514	13	82·9	2·10	84·2	1·68

Eruptive Fevers.—There were two admissions for measles and two for scarlet fever.

Continued Fevers.—The admission rate is 32·1, and the death rate 3·18 per 1,000 men higher than in the preceding year. Of the cases, 920 are returned as febricula, 159 as simple continued fever, and 94 as enteric fever. The deaths, 32 in number, were all from the latter disease, which is responsible for an admission rate of 15·16 per 1,000 of the strength, and a death rate of 5·16.

The following table, compiled from the station hospital returns, shows the number of admissions into hospital, and the number of deaths occasioned by enteric fever, for each month of the year:—

Months.	Station Hospitals.										Total.	
	Valetta.		Cottonera.		Pembroke Camp.		Cetta Vecchia.		Gozo.			
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
January -	—	—	2	—	—	—	1	—	—	—	3	—
February -	2	2	1	—	—	—	—	—	—	—	3	2
March -	—	—	—	—	—	—	—	—	—	—	—	—
April -	—	—	1	—	—	—	—	—	—	—	1	—
May -	2	2	1	—	—	—	—	—	—	—	3	2
June -	—	—	—	—	—	—	1	—	—	—	1	—
July -	8	3	2	—	—	—	1	—	1	1	12	4
August -	8	7	2	2	—	—	1	—	—	—	11	9
September	4	2	1	—	1	—	—	—	—	—	6	2
October -	14	2	8	4	2	—	—	—	—	—	24	6
November	5	—	15	3	4	—	—	—	—	—	24	3
December	3	1	2	1	1	2	—	—	—	—	6	4
Total -	46	19	35	10	8	2	4	—	1	1	94	32

As shown in the above table cases of enteric fever occurred during every month of the year except March. This disease does not, however, appear to have assumed an epidemic form until July, but more than half the cases were admitted in the months of October and November, the type was apparently of less severity during the last three months of the year than during the three immediately preceding them, or perhaps the temperature or other climatic causes may have influenced the mortality during the hotter months. The medical officer in charge of the Cottonera Hospital, in his annual report, states that of the 35 cases treated in that hospital, seven were admitted from Pulveristo barracks, two from Vittoriosa, one from Floriana, eight from Verdala, two from St. Angelo, one from Cottonera Hospital, three from Isola Gate, five from Ricasoli, one from Notre Dame, and five from Zabba Gate. This information is not given in the reports from the other hospitals. The cause of the outbreak does not seem to have been clearly ascertained, but the same medical officer writes:—"The various barracks have been reported to me by the medical "officers in charge of them as being in good sanitary condition, and although "complaints have now and then been made about the water, the quality of "it, after analysis, has always, I think, been pronounced good. The weather "during September, October, and November was very exceptional; heavy rain "fell very early in September, and with one night only excepted there was an "entire cessation of it for six weeks, the wind all that time being from the "south, a most unpleasant wind in the island, being loaded with moisture and "very depressing in its effects. I must not omit to state that drains in the "district during the year have in many situations been for long distances open "for the purpose of carrying out a reform in the drainage, this must have let "loose most obnoxious gases, a fact that could not be doubted when passing "along the streets. In conclusion, I am of opinion that the disease is not, "as a rule, contracted in the barracks, but in the haunts that the men resort "to when off duty. I have referred to the deaths among the civil population, "and find that those for typhoid fevers furnished a per-centage of ·04, whilst "among the military it was 1·5. During the year 392 deaths from *enteritis* (?) occurred among the civil population," a significant fact when "considered with the number of cases of enteric fever among the troops.

Malta.

There was nothing unusual in the symptoms or course of the disease, except that in a few cases, the number is not stated, diphtheritic symptoms were present. In some of these well-marked diphtheritic membranes were observed on the tonsils, and after death, along the course of the intestinal canal, covering in many instances the ulcers. The same was observed in one fatal case occurring in Cyprus, which is noticed in the health report on the troops quartered in that Island. The disease appears to have stuck most persistently to the 1st Battalion of the 1st Regiment during the last eight months of the year. This corps was quartered in the Valetta district until October, when it was moved to the Cottonera district, with detachments at Pembroke camp. In the Valetta district it lost one man in May from enteric fever, two in July, three in August, two in September, and one in October. In the Cottonera district it lost one in August, one in October, and one in November, and two men died at Pembroke camp in December.

Simple Continued Fever and Febricula were unusually prevalent, and a very large proportion of the admissions occurred during the latter half of the year. The highest admission rate was reached in August, viz., 34 per 1,000 of the average strength for that month; in July it was 29 per 1,000 men. The 1st Battalion of the 1st and the 61st Regiments, recent arrivals from England, furnished a large proportion of the admissions.

Constitutional Diseases.—Rheumatism was more prevalent than in 1877. The admission rate is 10·6 per 1,000 of the strength higher.

Syphilis.—The admission rate is 4·8 per 1,000 of the strength lower than for the preceding year. Of the cases, 93 were returned as primary syphilis, 27 as secondary, and 5 as venereal bubo. The medical officer in charge of the station hospital at Valetta writes that "many of the admissions were caused " by men who had evidently contracted the disease before leaving England."

Scrofula and Phthisis.—The admission rate is double that of 1877, and that for the deaths ·48 per 1,000 higher. Scrofula caused 3 of the admissions, phthisis 51, and hæmoptysis 22. More than half the deaths occurred in men who were sent to this country as invalids.

Local Diseases.—*Nervous System.*—The admission rate is half that of the preceding year, and the death rate is lower by ·06 per 1,000 men. The deaths were due to apoplexy 2, and to meningitis 1. Epilepsy, neuralgia, and sciatica, each caused 9 of the admissions, and 12 men were treated for mental affections.

Diseases of the Eye were less prevalent than in 1877; the admission rate is 8·2 per 1,000 of the strength lower. Of 188 admissions, 145 were for conjunctivitis.

Diseases of the Circulatory System.—The admission and death rates for this order are respectively, 3·2 and ·7 per 1,000 of the strength lower than in the preceding year. Three of the deaths were from aortic aneurism, and 1 from pericarditis. Palpitation caused 70 admissions, valvular disease of the heart 12, and varicose veins 12.

The Respiratory System.—These diseases were less prevalent, and the death rate is lower than in 1877. The deaths, 2 in number, were from pneumonia and pulmonary extravasation. Bronchitis caused 146 of the admissions, bronchial catarrh 81, pneumonia 14, and pleurisy 12.

The Digestive System.—The admission and mortality rates for diseases of this order are respectively lower by 27·3 and ·15 per 1,000 of the strength than in the preceding year. Of the deaths, 3 were from suppurative inflammation and 1 from cirrhosis of the liver, 3 from dysentery, and 1 from peritonitis. Of the admissions, 200 were for tonsillitis, 253 for dyspepsia, 42 for dysentery, 268 for diarrhœa, 32 for tænia solium, 19 for hæmorrhoids, 32 for hepatitis, 44 for jaundice, &c.

The Urinary System.—The admission rate for this order is higher by 6·2 per 1,000 men, and that for the deaths by ·47. Gonorrhœa caused 259 of the admissions, and stricture of the urethra 10. To Bright's disease 3 of the deaths were due, and to extravasation of urine, the result of rupture of the urethra 1, the accident occurred to a man with a stricture of old standing, while straining violently to pass water, "he reported himself sick on the 15th," with extensive extravasation of urine into the scrotum, penis, upper part of both thighs and the perinæum. A catheter was passed after a little difficulty,

and the case appeared to do well for six days, but on the seventh symptoms of uræmic poisoning set in, and he died on the ninth day. *Malta.*

The Generative System.—There is a large increase in the proportion of admissions when compared with last year; 86 were for orchitis, 8 for varicocele, and 4 for hydrocele.

Cutaneous System.—These diseases were less prevalent, and the admission rate, when compared with last year, is 23·7 lower. Ulcers contributed 135 of the admissions, and boils 116.

Debility.—No information is given as to the disproportion between the admission rate for this, when compared with last year, which it exceeds by 39·6 per 1,000 of the strength. It is not improbable, however, that it is due to men who did not regain their strength quickly after febrile attacks, being readmitted under this head.

Poisons.—The admissions were in the same proportion as last year. There were 12 cases of delirium tremens, and 3 of alcoholic poisoning.

Injuries.—*Accidental.*—There is a lower admission rate by 11·9 per 1,000 men than in 1877; the death rate was, however, higher fractionally. Sprains, contusions, and wounds furnished 642 of the admissions; drowning was the cause of 6 of the deaths, and concussion of the brain of 2. *Suicidal.*—There were 2 admissions for cut-throat, and the death, which occurred out of hospital, was from poisoning by oxalic acid.

Officers.

In an annual average strength of 221 officers, there were 217 attacks of illness, and 1 death; 12 officers were invalided to England during the year; the rates given by these numbers are, for attacks of illness, 982, for mortality 4·52, and for invaliding 54·30 per 1,000 of the strength respectively.

Diseases of the *febrile group* caused 85 of the illnesses; rheumatism in its various forms 19, and diseases of the digestive system 41, of the latter 14 were cases of diarrhœa. The death was from enteric fever.

Women.

In an annual average strength of 523 wives of non-commissioned officers and men, there were 373 attacks of illness, and 10 deaths, being in the rates of 713 and of 19·12 per 1,000 of the strength respectively.

The deaths were due to enteric fever 4, remittent fever 1, puerperal fever 1, phthisis 1, pericarditis 1, and debility 2.

Children.

In an average annual strength of 962 children of non-commissioned officers and men, there were 591 attacks of illness, and 53 deaths, being in the rates of 614 and of 55·09 per 1,000 of the strength respectively. The deaths were caused by simple continued fever 1, diphtheria 2, tabes mesenterica 2, anæmia 1, hereditary syphilis 1, meningitis 1, convulsions 1, disease of the heart 1, croup 3, bronchitis 5, dysentery 2, diarrhœa 17, teething 8, premature birth 3, and debility 5.

Royal Malta Fencible Artillery.

In an annual average strength, 345 non-commissioned officers and men, there were 245 admissions into hospital, 3 deaths, and 10·49 men were constantly sick. The admission rate is 710·1, that for the deaths 8·70, and that for the constantly sick 30·41 per 1,000 of the strength. The admission rate is higher by 96·3, that for the deaths by 2·94, and that for the constantly sick by 13·58, than for last year.

Malta.

The admissions and deaths in the different classes and orders of diseases are shown in the following Table :—

Orders.	Diseases.	Average Annual Strength.	Royal Malta Fencible Artillery.					
			345.		Annual Ratio per 1,000.			
					1878.		1869–77.	
			Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	I.—*General Diseases.*							
1	Febrile Group		27	—	78·3	2·90	61·9	1·24
2	Constitutional Group		33	1	95·6	2·90	89·7	·74
	II.—*Local Diseases.*							
	Diseases of the—							
1	Nervous System		3	1	8·7	—	9·7	·74
2	Eye		20	—	58·0	—	116·7	—
3	Ear		1	—	2·9	—	2·7	—
4	Nose		—	—	—	—	·8	—
5	Circulatory System		10	—	29·0	—	7·9	·74
6	Absorbent „		2	—	5·8	—	5·0	—
8	Respiratory „		31	1	89·8	2·90	52·5	—
9	Digestive „		27	—	78·3	—	151·1	1·24
10	Urinary „		23	—	66·6	—	59·5	—
11	Generative „		1	—	2·9	—	8·7	·25
12	Organs of Locomotion		—	—	—	—	2·7	—
13	Cellular Tissue		6	—	17·4	—	33·2	—
14	Cutaneous System		22	—	63·8	—	104·1	—
	III.—*Conditions.*							
	Debility		—	—	—	—	1·7	—
	IV.—*Poisons*		—	—	—	—	·8	—
	V.—*Injuries.*							
2	Accidental		39	—	113·0	—	59·0	—
3	Homicidal		—	—	—	—	·5	·25
4	Self-inflicted		—	—	—	—	·3	·25
	No appreciable disease		—	—	—	—	·5	—
	Total		245	3	710·1	8·70	769·0	5·45
	Average of 10 years, 1868–77		—	—	775·3	6·29	—	—

General Diseases.—The admission rate is higher by 4·0 per 1,000 men than in 1877. *Febrile Diseases* were more prevalent, and the admission rate consequently is 9·2 higher. *Constitutional Diseases* were less so, the admission rate being 5·2 per 1,000 of the strength lower. In the former subdivision febricula is the only disease for which there were any admissions; notwithstanding that enteric fever was so prevalent among the white troops in the Command, there were no cases of the disease in this corps. In the latter subdivision 18 of the admissions out of 33 were for syphilis (8 for primary, and 10 for secondary syphilis), and 10 were for rheumatism. The death was from phthisis.

Local Diseases.—*Diseases of the Nervous System.*—There were 2 admissions for epilepsy, and 1 for melancholia. The death was from apoplexy.

Diseases of the Eye were more prevalent than last year. Conjunctivitis was the principal cause of a slight increase in the admission rate. *Malta.*

Diseases of the Circulatory System.—Four admissions for valvular disease of the heart, and 6 for palpitation, caused a rise in the admission rate of 5·9 per 1,000 of the strength.

Diseases of the Respiratory System give an admission rate double that of last year. Bronchitis was the principal cause of the increase. The death was from pulmonary congestion.

Diseases of the Digestive System.—The admission rate is fractionally higher than in 1877.

Diseases of the Urinary System.—These diseases were more prevalent than last year, the admission rate is 14·7 per 1,000 men higher. Gonorrhœa furnished 22 cases, some of these were, however, re-admissions "in men who were "discharged from hospital in the first instance before complete recovery."

INJURIES.—The admission rate is 32·3 per 1,000 men higher than in the preceding year. Of the cases, 14 were of a trivial nature, 16 were blisters of the feet, occurring, it is explained, "among recruits who before joining had "been unaccustomed to wear boots."

III.—CYPRUS.

STATISTICAL REPORT.

The annual average strength of the troops in the Command, from the 24th of July to the 31st December was 894 non-commissioned officers and men; the admissions into hospital were 3,931, and the deaths in the Command were 33; in addition to which 2 invalids died on board ship, and 1 at Malta, making the total number of deaths for the year 36. The admission rate is 4397·1, and the death rate 40·27 per 1,000 of the strength. *Cyprus.*

The Corps which served in Cyprus in the year, and some of the most important of their health statistics, are shown in the following Table:—

Corps.	Annual Average Strength.	Admissions into Hospital.	Died. At Cyprus.	Died. Of Invalids.	Died. Total.	Invalids sent Home.	Ratio per 1,000 of the Strength. Admissions.	Deaths.	Invalided.
Royal Artillery	10	64	1	—	1	1	6400·0	100·00	100·00
Royal Engineers	85	418	4	—	4	16	4917·6	47·06	188·23
1st Battalion, 20th Foot	25	39	—	—	—	—	1560·0	—	—
42nd Foot	261	1,258	12	1	13	61	4810·0	49·81	233·71
71st Foot	298	1,083	5	1	6	13	3634·2	20·13	43·62
101st Foot	172	841	5	1	6	23	4889·5	34·88	133·72
Army Service Corps	21	228	3	—	3	10	5302·3	142·86	476·19
Army Hospital Corps	20		3	—	3	11		150·00	550·00
Men of other Corps	2		—	—	—	—		—	—

Cyprus.

The Principal Medical Officer writes that "the 42nd and 71st Regiments "only, are fairly comparable in an examination of the degrees of healthiness "of the various corps. Not only was the prevalence of sickness higher in "the first named, but the severity of that occurring, as shown in the resulting "mortality and invaliding, was very much greater. The difference is suffi- "ciently accounted for by the fact that the 42nd was stationed in a locality "less favourable for health than that, for the greater part of the time, occu- "pied by the 71st; one where illness was more frequent, and where it was not "recovered from, the individual attacked often suffering again and again from "recurrences. In the instance of the 71st, the Regiment suffered from the "same illness that prevailed in the 42nd, but the disease was usually re- "covered from, and did not pass into the chronic malarial condition so com- "mon in the 42nd, the influence of which is reflected in its death and in- "validing rates."

The classes and orders of diseases by which the sickness and the mortality in the Command were caused are shown in the following Table:—

Orders.	Diseases.	Strength, 894.				Ratio per 1,000 of Mean Strength.	
			Deaths.			1878.	
		Admitted.	In Cyprus.	Of Invalids.	Total.	Admitted.	Died.
	I.—*General Diseases.*						
1	Febrile Group	3,320	20	2	22	3713·6	24·61
2	Constitutional Group	68	2	—	2	76·1	2·24
	II.—*Local Diseases.*						
	Diseases of the—						
1	Nervous System	18	3	—	3	20·1	3·35
2	Eye	27	—	—	—	30·2	—
3	Ear	3	—	—	—	3·4	—
5	Circulatory System	3	—	—	—	3·4	—
6	Absorbent „	5	—	—	—	5·6	—
8	Respiratory „	33	1	—	1	36·9	1·12
9	Digestive „	226	6	1	7	252·8	7·83
10	Urinary „	24	—	—	—	26·9	—
11	Generative „	6	—	—	—	6·7	—
12	Organs of Locomotion	6	—	—	—	6·7	—
13	Cellular Tissue	29	—	—	—	32·4	—
14	Cutaneous System	30	—	—	—	33·6	—
	III.—*Conditions, &c.*						
	Debility	71	1	—	1	79·4	1·12
	IV.—*Poisons*	2	—	—	—	2·2	—
	V.—*Injuries.*						
2	Accidental	56	—	—	—	62·6	—
4	Self-inflicted	3	—	—	—	3·4	—
	No appreciable disease	1	—	—	—	1·1	—
	Total	3,931	33	3	36	4397·1	40·27

General Diseases.—The admissions and deaths from the principal diseases in this class are shown in the following Table:—

Diseases.	Admitted.	Deaths.	Ratio per 1,000 of Strength. 1878. Admitted.	Ratio per 1,000 of Strength. 1878. Died.
Febrile Group.				
Continued Fevers - - -	220	2	246·1	2·24
Paroxysmal Fevers - -	3,098	19	3465·3	21·25
Other Diseases - - -	2	1	2·2	1·12
Total - - -	3,320	22	3713·6	24·61
Constitutional Group.				
Rheumatism - - -	30	—	33·6	—
Syphilis - - - -	18	—	20·1	—
Scrofula, Phthisis, &c. - -	10	2	11·2	2·24
Scurvy and Purpura - -	8	—	9·0	—
Anæmia - - - -	2	—	2·2	—
Total - - -	68	2	76·1	2·24

Continued Fevers.—*Enteric Fever.*—The Principal Medical Officer writes:—"Of the 14 admissions returned for this kind of fever, 1 occurred "in September at Larnaca, and 1 in October at the same place; 10 occurred "in November, 3 of them at Larnaca, 4 at Mathiati, and 3 at Nicosia; 2 "occurred in December, 1 at Nicosia, and 1 at Mathiati. The earliest case "was recognised only after death, and then doubtfully; the patient was under "treatment for debility, succeeding an attack of malarial fever, but the pro- "minent symptoms became, gradually, those of a supposed intercurrent "dysentery. On examination of the body no abnormal appearances were "found in the lungs, heart, liver, or spleen. In the ileum Peyer's patches "were congested and prominent, and one of the solitary glands was ulcerated. "In the large intestine there were about 30 small ulcers, corresponding in "situation to the solitary glands; the mesenteric glands were much enlarged. "The illness lasted about a month. In the next fatal case, at Larnaca, ulcers "typical of enteric fever were found in the lower part of the ileum, and the "spleen was slightly enlarged. In the other cases returned as enteric fever "the diagnosis was not unequivocal; the nature of the disease was inferred "from the presence of some of the symptoms deemed pathognomonic of this "fever (notably that of the eruption of rose-coloured papules), and from the "pathological conditions found in the bodies of two men who died, rather "than determined from a consideration of the whole course of the illnesses. "The temperatures were never those found to be constant in well observed "cases of enteric fever, and in most of them attacks of ague occurred during "the course of the illness; but an intercurrent ague seems no more to exclude "the idea of enteric fever being the primary disease than a secondary pneu- "monia does. The determination of the nature of the illness in similar cases "will require further investigation.

"*For Simple Continued Fever and Febricula,* 206 admissions are returned. "They were illnesses due to the heat of the sun, and, when uncomplicated, "were of short duration. When seen the patient had a very high temperature "105° to 106°), which soon fell rapidly and continuously; in two days the ill- "ness had probably disappeared. Far more commonly, however, it joined on "tothe fever of paludal origin which attacked so many in these instances the

Cyprus.

" ardent fever excited into activity the malarial disease which had infected " the body.

" *Paroxysmal Fevers*, returned as ague in 895 instances, and as remittent in " 2,203. The fevers in this group were only certain of the phenomena in the " course of a disease due to the infection of marsh miasm, which attacked " many organs of the body, and might be fatal in a short time through the " changes produced in them, or in a longer time by the slower effect of the " dyscrasia which was set up as a consequence of its long continuance. The " periodical recurrence of fever was, however, an exceedingly important one in " the series of manifestations due to the malarial disease; when of exceeding " violence it caused death in about four days, without the supervention of " any apparent secondary affection; more often, in fatal cases, death occurred " in from 10 to 14 days. The illness rarely ended after one attack of fever in " a way that, in a favourable case, illness ends in the recovery of the patient " after an attack of typhus or rheumatic fever. The miasm was not elimi- " nated, or continuous infection kept up the malarial disease. The access of " fever might be followed after a few hours by, in an interval of comparative " health, an intermission; or there might be an abatement of the fever for a " few hours, a remission, followed by another access, and perhaps another, " before the interval of comparative health set in; or the remissions, or an " access of fever, might be so short and indistinct as to be indistinguishable. " But it was characteristic of the fever, in this illness, that the access very " often returned after a period of seven days from the last fall in the tem- " perature. As in marsh fevers in other places, the fever access might return " every day, or every second, or every third or other day. In this fever the " type was that of a seven days access, but it rarely remained so long, as the " access became irregular, was advanced or retarded, and the severer form of " a fever with remissions tended normally to end, in one, with intermissions. " The continuity of the illness was not broken, however, nor, in every in- " stance, was the change for the better. The coma which occasionally came " on in the cold stage of the fever was very dangerous.

" *Other Diseases.*—Under this head 2 admissions for diphtheria are returned. " This disease had prevailed very widely and fatally, both in the preceding " and current year, amongst the civil population of the Island. It was not " seen, however, amongst the troops until the end of the year, and then it " appeared almost simultaneously at Larnaca, Mathiati, and Nicosia. The " attack at Larnaca was fatal, and much interest attaches to the case from the " fact that in it diphtheria and enteric fever run their course together. The " patient was first seen on the 18th December with an illness which was sus- " pected to be enteric fever; on the 23rd the fauces and root of the tongue " were covered with a partly-detached diphtheritic membrane; he died on the " 24th, apparently from exhaustion, after coughing up a quantity of diphthe- " ritic exudation. On examination after death, the pharynx was found to be " much congested, and there were patches of grey coloured exudation on it " and on the root of the tongue; patches of the same exudation were seen on " the mucous membrane of the larynx and trachea, as low down as the bifur- " cation; the blood was in a fluid state, and there were numerous extrava- " sations of blood in the interstitial substance of the lungs. Commencing at " 3 feet from the cæcum, the solitary glands of the small intestine and " Peyer's patches were hyperæmic; below this they were raised and prominent " from the characteristic fever deposit; lower down still Peyer's patches were " ulcerated, the ulcers being in every respect similar to those typical of enteric " fever. In the cæcum also there were many ulcers. There was no enlarge- " ment or even congestion of the mesenteric glands. The subject of the " attack of diphtheria at Mathiati was a soldier of the 20th Regiment, the " father of a family of children who suffered from the illness, no doubt derived " from one acquired originally at Halifax, Nova Scotia, whence they had " recently arrived."

Rheumatism was comparatively infrequent.

Syphilis.—" The admissions for this disease were those of men who, in every " instance except one, had acquired it elsewhere."

Scrofula and Phthisis.—" The admissions for diseases of this group were " comparatively numerous. The exposure to the excessive heat in the summer " months brought forward latent disease in those in whom it was present."

Scurvy and Purpura.—"The 8 admissions returned for diseases in this group were those of men who, having suffered from malarial fever, could not eat ordinary food. One of the cases was very severe; the others were slight." *Cyprus.*

LOCAL DISEASES.—Diseases of the *nervous system* were all due to the effect of exposure to the excessive heat. Two of the fatal cases were returned as apoplexy, and the third as sunstroke; the latter affection caused 5 of the admissions, neuralgia 8, and epilepsy 2.

Diseases of the Eye.—"The prevalence of diseases of this group was moderate; the cases were usually of great severity; the 71st Regiment suffered more, relatively, than any other corps." Conjunctivitis caused 22 of the admissions.

Diseases of the Respiratory System.—The proportion of admissions for diseases of this nature is somewhat lower than that for the Mediterranean stations generally. Of the admissions 24 were for bronchitis and bronchial catarrh, 2 for asthma, 4 for pleurisy, and 3 for pneumonia. The death was from the latter disease.

Diseases of the Digestive System.—"The admission and death rates are both considerably higher than the average for the other Mediterranean stations. The exceptional circumstances in which the troops were placed account for the excess. *Dysentery:* of the 28 attacks of this disease, 4 were fatal; a large proportional mortality due to the fact that they were secondary affections in the course of chronic malarial disease. Attacks of dysentery occurring as a primary disease, though severe, were manageable. *Tænia solium* caused 4 admissions, and in 3 instances this parasite was found in the bodies of men who had died from other illnesses. Inquiry seemed to establish the fact that the men had been infected at Malta, where they were stationed previously," and in which Command it would appear from the annual sick returns that there were 32 admissions during the year; "on one occasion, however, meat issued to the troops at Mathiati was found to contain cysticerci. *Hepatitis:* all the admissions for this disease (23) may be regarded as secondary to attacks of malarial fever. One death occurred in the Command from abscess," and a second on board ship, in an invalid, during the voyage to England. The Principal Medical Officer writes of this disease that "recovery took place not infrequently after symptoms of suppuration were present, and it was considered, I think with justice, that the use of chloride of ammonium, in these cases, contributed to the satisfactory result. It is possible, however, that in some of them the rigors which occurred, may not have been in connexion with the formation of matter, but were consequent on an access of fever." *Peritonitis.*—The death from this disease was that of a man transferred to hospital from the ship in which he arrived from Malta; the remote cause of death was an abdominal tumour. Some of the *other diseases* which helped in a great measure to swell the admission rate for this order were tonsillitis 20 admissions, dyspepsia 30, and diarrhœa 92, on these no special remarks are made.

Urinary System.—There were 15 admissions for gonorrhœa. No information is given as to where the disease was contracted, but as 6 men were admitted into hospital in July, and 8 in August, it is not improbable but that the majority if not all the cases were imported.

CONDITIONS.—*Debility.*—"The admissions in this order were due to the state of chronic malarial illness from which so many men suffered."

POISONS.—"One of the admissions was for delirium tremens, and one for an overdose of quinine."

INJURIES.—*Accidents.*—Of the admissions, 2 were for burns or scalds, 13 for contusions, 4 for fractures, 17 for wounds, 12 for sprains, and 8 for blisters of the feet.

Cyprus.

Officers.

In an average annual strength of 48 officers, 101 attacks of illness are returned, being in the rate of 2104·2 per 1,000 of the strength, but as it often happened that officers were not returned when sick, the statement does not show the real incidence of sickness amongst them. There were three deaths, being in the rate of 62·50 per 1,000 of the strength. Twenty-three officers were invalided, being in the rate of 479·17 per 1,000.

The officers suffered from illnesses of the same nature as those from which the men suffered, but usually less severely, and in the instance of malarial fever, the illnesses were not followed by the same long continued weakness. The advantage of early removal from the country enjoyed by the officers reduced the apparent prevalence of sickness in the class.

Enteric Fever.—An officer contracted this disease when stationed at Limassol.

Diphtheria.—The attack occurred at Nicosia, but was acquired elsewhere.

Women.

There were no women, wives of non-commissioned officers and men, present in the Command until the arrival of the 1st Battalion 20th Foot in the second week in December; their average annual strength was 2·52, and two attacks of illness are returned; one, for phthisis, was fatal; the disease did not originate in the command.

Children.

In an average annual strength of 3·83 children of the non-commissioned officers and men, there were 13 attacks of illness, and one death; seven of the illnesses were from diphtheria, one of which was fatal. Although diphtheria was prevalent in the Command very soon after the arrival of the 1st Battalion 20th in it, there is no doubt that the disease amongst the children of the battalion was acquired at Halifax, where it was quartered previously; the children in whom the disease was first seen, had been ill on board ship.

The diphtheria was of a comparatively mild kind, that is, was not one in which blood poisoning occurred; the cases were probably the last ones in an epidemic approaching extinction, not the first ones of a commencing epidemic. In the fatal case death was proximately due to the extension of inflammation from ulcers in the pharynx to the glottis.

Section II.

Extent of Invaliding among the troops serving in the Mediterranean.

The number of men sent home from Gibraltar as invalids was 238, from Malta 302, and from Cyprus 135, making a total of 675 for the Mediterranean. The ratio per 1,000 of the strength for each station, is for Gibraltar 50·62, Malta 48·70, and for Cyprus 151·01, and collectively 57·22. Of the invalids from Gibraltar 116 or 24·67 per 1,000 men were discharged the service, from Malta 173 or 27·89, from Cyprus 19 or 21·25, giving a total of 307 or 26·02 per 1,000 men.

The classes and orders of diseases to which the invaliding was due, are shown in the following Table:— *Mediterranean.*

Orders.	Diseases.	Invalids sent Home from Gibraltar. Strength. 4,702	Malta. 6,201	Cyprus. 894	Total. 11,797	Invalids discharged the Service. Gibraltar.	Malta.	Cyprus.	Total.
	I.—*General Diseases.*								
1	Febrile Group	23	5	70	98	—	—	—	—
2	Constitutional Group	62	55	6	123	24	30	1	54
	II.—*Local Diseases.*								
	Diseases of the—								
1	Nervous System	11	20	6	37	3	6	—	9
2	Eye	5	21	—	26	3	16	—	19
3	Ear	5	16	—	21	2	15	—	17
5	Circulatory System	23	38	—	61	14	38	—	52
6	Absorbent „	—	1	—	1	—	—	—	—
8	Respiratory System	18	10	2	30	12	6	—	18
9	Digestive „	10	18	15	43	7	9	—	16
10	Urinary „	4	7	1	12	3	—	—	3
11	Generative „	—	2	—	2	—	2	—	2
12	Organs of Locomotion	8	8	2	18	8	4	1	12
13	Cellular Tissue	—	2	—	2	1	2	—	3
14	Cutaneous System	4	3	—	7	3	3	—	6
	III.—*Conditions, &c.*								
	Debility	56	92	33	181	29	30	17	76
	IV.—*Poisons.*								
	V.—*Injuries.*								
2	Accidental	7	4	—	11	5	10	—	16
	VI.—*Surgical Operations*	2	—	—	2	2	2	—	4
	Total	238	302	135	675	116	173	19	307
	Ratio per 1,000 of mean strength — 1878	50·62	48·70	151·01	57·22	24·67	27·89	21·25	26·02
	Ratio per 1,000 of mean strength — 1868–77	26·01	25·27	—	25·63	16·24	16·76	—	—

There is a large increase in the invaliding rate for Gibraltar of 30·12 per 1,000 of the strength, when compared with last year. This increase is not limited to any special class or order of disease, but is highest for febrile diseases, and diseases of the circulatory, respiratory, and digestive systems. The rate for men finally discharged the service is, within a fraction, double that of last year. Diseases of the circulatory, respiratory, and digestive systems, and of the organs of locomotion and debility, were the principal causes of the increase.

The invaliding rate for Malta is also very high, being in excess of last year's by 29·80 per 1,000 of the strength. For febrile diseases and accidental injuries the proportions are less, but they are greater in nearly all the other principal classes and orders. The rate for those finally discharged is nearly double that for last year. Constitutional diseases, diseases of the eye, the ear, the circulatory, respiratory, and digestive systems, debility, and accidental injuries are chiefly responsible for the excess.

Mediterranean. The invaliding from Cyprus is as yet not a fair test of what may be expected for the future in this respect. The troops were landed under very exceptional circumstances and were quartered in the island during the unhealthy months, only, of what was supposed to be a very unhealthy season.

Section III.

Mean Daily Sick.

The average number of constantly sick amongst the non-commissioned officers and men in Gibraltar was 175, and in Malta 308, being in the annual rates of 37·22, and of 49·67 per 1,000 of the strength. This information for Cyprus is not given in the return furnished by the Principal Medical Officer.

The usual information, calculated from these numbers, is given in the following Table:—

	Gibraltar.	Malta (exclusive of the Royal Malta Fencible Artillery).
Ratio per 1,000 constantly sick - 1878 -	37·22	49·67
Ratio per 1,000 constantly sick - 1868–77	34·16	40·56
Average sick time to each soldier - 1878 -	13·58	18·15
Average sick time to each soldier - 1868–77	12·46	14·80
Average duration of each case of sickness - - - - 1878 -	20·23	20·31
Average duration of each case of sickness - - - - 1868–77	18·97	18·26

For Gibraltar the results are favourable as compared with those of the preceding year; the number of constantly sick is less by 2·33 per 1,000 men. The average sick time to each soldier is less by ·86 days, and the average duration of each case of sickness is less by 1·54 days. For Malta the rate of constantly sick is higher by 3·77 per 1,000 men. The average sick time to each soldier is higher by 1·40 days, and the average duration of each case of sickness is higher by 1·63 days.

Section IV.

On the Influence of Age on the Mortality.

The death rates of the non-commissioned officers and men serving in Gibraltar and Malta at the several ages arranged in quinquennial periods, are shown in the following Table:—

	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
	1,166	5	4,377	44	2,683	17	1,256	9	1,125	9	439	8
Ratio per 1,000 of strength. 1878 -	4·29		10·05		6·34		7·17		8·00		18·22	
Ratio per 1,000 of strength. 1868–77	2·67		6·41		8·79		11·16		15·03		21·36	

IV.—ON THE HEALTH OF THE TROOPS SERVING IN THE DOMINION OF CANADA.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

Dominion of Canada.

THE average annual strength of the non-commissioned officers and men was 1,725; the admissions into hospital were 1,012; the deaths in the Command, with that of an invalid, were 10; the average number of constantly sick was 51·47. The proportions given by these numbers are, for admissions 586·7, for deaths 5·80, and for constantly sick 29·84 per 1,000 of the strength, respectively. Compared with the preceding year, the rate of admissions is 28·9 per 1,000 men higher, the rate of deaths is ·07 lower, and the rate of constantly sick is 1·09 per 1,000 lower.

The corps which served in the Dominion of Canada in the year, and some of the most important health statistics, are shown in the following Table:—

Corps.	Completed years of Service in the Command.	Annual Average Strength.	Admissions into Hospital.	Died. In Canada.	Died. Of Invalids.	Died. Total.	Invalided home.	Average Number constantly Sick.	Ratio per 1,000 of the Strength. Admissions.	Deaths.	Invalided.	Constantly Sick.	Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.
													Days	Days.
Royal Artillery	2	304	128	1	—	1	4	4·36	422·4	3·20	13·20	14·34	5·25	12·48
Royal Engineers	varied	96	55	—	—	—	3	2·13	572·9	—	31·25	22·19	8·10	14·14
1st Battalion, 20th Foot.	1	582	278	5	1	6	12	17·31	477·7	19·70	20·61	29·74	10·86	22·73
97th Foot	2	630	317	2	—	2	8	17·92	504·0	6·60	14·30	28·44	10·38	20·63
101st Foot	—	82	226	1	—	1	—	9·54	2797·6	3·30	—	116·34	42·46	15·41
Army Service Corps.	varied	12	1	—	—	—	—	·03	256·8	—	—	6·74	2·46	9·53
Army Hospital Corps.	„	14	3	—	—	—	—	·09						
Attached Men	„	15	4	—	—	—	—	·09						
Garrison Staff, &c.	„	5	—	—	—	—	—	—						

Dominion of Canada.

The admissions and deaths from the various classes and orders of diseases are shown in the following Table:—

Orders.	Diseases.	Strength, 1,725.				1878.		1869–77.	
		Admissions.	Deaths.			Annual Ratio per 1,000.		Annual Ratio per 1,000.	
			In Canada.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	I.—*General Diseases.*								
1	Febrile Group	133	—	—	—	77·1	—	36·1	·50
2	Constitutional Group	149	3	—	3	86·4	1·74	103·5	1·30
	II.—*Local Diseases.*								
	Diseases of the—								
1	Nervous System	6	2	1	3	3·5	1·74	9·8	·65
2	Eye	16	—	—	—	9·3	—	13·8	—
3	Ear	7	—	—	—	4·1	—	3·3	—
4	Nose	1	—	—	—	·6	—	·6	—
5	Circulatory System	18	—	—	—	10·4	—	9·0	1·26
6	Absorbent „	25	—	—	—	14·5	—	14·4	—
7	Ductless Glands	—	—	—	—	—	—		—
8	Respiratory System	97	1	—	1	56·2	·58	74·1	1·68
9	Digestive „	120	1	—	1	69·6	·58	87·9	·38
10	Urinary „	113	—	—	—	65·5	—	69·3	·27
11	Generative „	20	—	—	—	11·6	—	9·9	—
12	Organs of Locomotion	4	—	—	—	2·3	—	4·4	·08
13	Cellular Tissue	23	—	—	—	13·3	—	20·6	·04
14	Cutaneous System	67	—	—	—	38·8	—	49·5	·04
	III.—*Conditions, &c.*								
	Debility	40	—	—	—	23·2	—	3·8	—
	IV.—*Poisons.*	19	—	—	—	11·0	—	9·0	·38
	V.—*Injuries.*								
1	Accidental	149	1	—	1	86·4	·58	89·9	·72
2	Homicidal	—	—	—	—	—	—	·1	·12
3	Self-inflicted	—	1	—	1	—	·58	·2	·46
	VI.—*Surgical Operations.*	—	—	—	—	—	—	·3	·04
	No appreciable disease	5	—	—	—	2·9	—	·7	—
	Total	1,012	9	1	10	586·7	5·80	610·2	7·91
	Average of 10 years, 1868–77	—	—	—	—	625·5	8·72	—	—

GENERAL DISEASES.—The rate of admissions in this class exceeds that for the preceding year by 68·5 per 1,000 men, the whole of the increase being in the *febrile group*. The death rate of the class is lower by ·61 per 1,000 men.

The admissions and deaths from the principal diseases in this class are shown in the following Table :— *Dominion of Canada.*

Diseases.	Admissions.	Deaths.	Ratio per 1,000 of Strength.			
			1878.		1869–77.	
			Admitted.	Died.	Admitted.	Died.
Febrile Group.						
Eruptive Fevers	—	—	—	—	2·1	·04
Continued „	2	—	1·2	—	15·6	·34
Paroxysmal Fevers	128	—	74·2	—	4·1	—
Cholera	—	—	—	—	·2	—
Influenza	1	—	·5	—	9·2	—
Erysipelas	—	—	—	—	4·0	·08
Other Diseases	2	—	1·2	—	·9	·04
Total	133	—	77·1	—	36·1	·50
Constitutional Group.						
Rheumatism	73	—	42·3	—	38·6	—
Syphilis	58	—	33·6	—	57·0	·04
Scrofula, Phthisis, &c.	13	3	7·5	1·74	5·8	1·15
Scurvy and Purpura	1	—	·6	—	·5	—
Anæmia	2	—	1·2	—	·5	—
Other Diseases	2	—	1·2	—	1·1	·11
Total	149	3	86·4	1·74	108·5	1·30

Continued Fevers.—Enteric fever caused one admission; the other was for febricula.

Paroxysmal Fevers.—The rate of admissions exceeds that of the preceding year by 72·5, this large increase being due to the 101st Regiment having been sent into the Command from Cyprus in November 1878, where it had suffered much from these affections and was in a very cachectic condition on arrival.

Rheumatism.—The rate of admissions is lower by 29·3 per 1,000 men than in the preceding year.

Syphilis.—The rate of admissions is 16·0 per 1,000 men higher than in 1877. Forty-two cases of primary and 13 of secondary syphilis occurred.

Scrofula, Phthisis, &c.—Compared with the preceding year there is an increase in the rate of admissions of 1·7 per 1,000 men, while the death rate is ·2 per 1,000 men lower. Nine of the admissions were for phthisis pulmonalis, and four for tubercular hæmoptysis.

Local Diseases.—*Diseases of the Nervous System.*—The rate of admissions is 6·5 per 1,000 men lower than in the preceding year.

Diseases of the Eye.—The rate of admissions is 2·4 per 1,000 men lower than in 1877.

Circulatory System.—The rate of admissions is 4·6 higher than in the preceding year, the increase being due to the greater prevalence of palpitation.

Respiratory System.—The rate of admissions is 4·0 per 1,000 men higher than in the preceding year.

Digestive System.—The rate of admissions is 52·4 per 1,000 men lower than in 1877, the diminution being chiefly in tonsillitis, and attributed to a drier condition of the atmosphere.

Urinary System.—The rate of admissions is 11·5 per 1,000 men higher than in 1877, the increase being due to the greater prevalence of gonorrhœa.

Poisons.—The rate of admissions is lower by 1·3 per 1,000 men than in 1877. Delirium tremens caused two of the admissions, the other 17 were cases of alcoholic poisoning, attributed to the facility for obtaining liquor of bad quality.

Dominion of Canada.

INJURIES.—*Accidental.*—The rate of admissions for accidental injuries is 2·6 per 1,000 men higher than in the preceding year; the death was from drowning. *Self-inflicted.*—The death was from a gun-shot wound inflicted during a fit of temporary insanity.

Officers.

In an average annual strength of 90 officers there were 37 attacks of illness, being in the rate of 411 per 1,000 of the strength. Two officers died during the year; one in the command from gout and congestion of the lungs, the other, while absent from his corps, of aneurism of the aorta. One officer was invalided to England.

Women.

In an average annual strength of 151 wives of non-commissioned officers and men, 40 attacks of illness are shown, being in the rate of 264·9 per 1,000 of the strength. Two died, one from continued fever, the other of apoplexy.

Children.

In an average annual strength of 312 children of non-commissioned officers and men, 84 attacks of illness are returned, being in the rate of 269·2 per 1,000 of the strength; the deaths were 12, being in the large rate of 38·46 per 1,000 of the strength; they were due to diptheria (2), meningitis (1), laryngitis (1), bronchitis (3), tonsillitis (2), teething (2), synovitis (1).

Section II.

On the Extent of Invaliding.

Twenty-seven invalids were sent to England during the year, and 18 were finally discharged the service.

The rate of primary invaliding is 1·11, and that of final invaliding 1·05 per 1,000 men higher than in 1877.

The diseases which necessitated invaliding are shown in the following Table:—

	Disabilities.	Invalids sent Home from Canada.	Invalids discharged the Service.	
			In Canada.	At Netley, &c.
	I. General Diseases.			
2	Constitutional	7	—	6
	II. Local Diseases.			
	Diseases of the—			
1	Nervous system	4	—	—
2	Eye	1	—	—
5	Circulatory System	2	—	1
6	Absorbent „	1	—	—
7	Ductless Glands	—	—	—
9	Digestive System	2	—	2
10	Urinary „	2	—	—
11	Generative „	1	—	—
12	Organs of locomotion	3	—	3
13	Cellular Tissue	—	—	—
14	Cutaneous system	3	—	2
	III. Conditions, &c.			
	Debility	1	—	4
	Total	27	—	18
	Ratio per 1,000 of strength 1878	15·65	—	10·43
	Ratio per 1,000 of strength 1868–77	18·55	2·43	11·55

Section III.

Mean Daily Sick.

The average number of constantly sick during the year was 51·47, being in the rate of 29·84 per 1,000 of the strength, showing a decrease of 1·27 per 1,000 on the rate of the preceding year.

The usual information calculated from these numbers is given in the following Table:—

	1878.	1867–77.
Ratio per 1,000 of strength constantly sick - -	29·84	29·80
	Days.	Days.
Average sick time to each soldier - - - -	10·89	10·88
Average duration of each case of sickness - - -	18·56	17·39

The average sick time for each soldier is fractionally lower than the corresponding rate for the previous year, whilst that of the average duration of each case of sickness is 1·68 per 1,000 lower.

Section IV.

On the Influence of Age on Mortality.

The death rates of the non-commissioned officers and men at the several ages (arranged in quinquennial periods) are shown in the following Table:—

	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
	61	—	315	2	691	4	152	1	136	2	85	—
Ratio per 1,000 of the mean strength 1878 -	—		6·35		5·78		6·58		14·71		—	
Ratio per 1,000 of the mean strength 1868–77	3·44		4·99		7·10		12·42		13·14		25·84	

V.—ON THE HEALTH OF THE TROOPS SERVING IN BERMUDA.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

Bermuda.

The average annual strength of the non-commissioned officers and men was 2,017; the admissions into hospital were 1,325, the deaths were 12, the average number constantly sick was 71·27. The proportions given by these numbers are, for admissions 656·9, for deaths 5·95, and for constantly sick 35·33 per 1,000 of the strength, respectively. The admission rate is 27·8 higher per 1,000 men than that for the preceding year, the death rate is 1·16 higher, and the constantly sick rate is 2·14 higher.

Certain particulars of the results of sickness in each of the corps serving in the Command are shown in the following Table:—

Corps.	Completed Year of Service in the Command.	Average Annual Strength.	Admitted into Hospital.	Died.	Invalided Home.	Average Number Constantly Sick.	Ratio per 1,000 of Strength.				Average Sick-time to each Soldier.	Average Duration of each Case of Sickness.
							Admitted.	Died.	Invalided.	Constantly Sick.		
											Days.	Days.
Royal Artillery -	—	210	85	—	1	3·87	404·8	—	4·76	18·43	6·73	16·61
„ Engineers -	—	436	317	2	5	16·24	727·1	4·59	11·47	37·25	13·60	18·70
1st Batt., 19th Regiment -	2nd	660	550	4	17	27·61	833·3	6·06	25·76	41·83	15·27	18·32
46th Regiment -	3rd	644	346	3	10	20·89	537·3	4·66	15·53	32·44	11·85	22·04
Departmental Corps, and Details -	—	67	26	2	1	2·42	388·1	29·85	14·92	36·12	13·19	33·97

The admissions and deaths in the various classes and orders of diseases are shown in the following Table :— *Bermuda.*

Orders.	Diseases.	1878. Average Strength, 2,017. Admitted into Hospital.	Deaths. In Bermuda.	Deaths. Of Invalids.	Deaths. Total.	Annual Ratio per 1,000 of the Strength. Admitted.	Annual Ratio per 1,000 of the Strength. Died.	1869–77. Annual Ratio per 1,000 of the Strength. Admitted.	1869–77. Annual Ratio per 1,000 of the Strength. Died.
	I.—*General Diseases.*								
1	Febrile Group	79	1	—	1	39·2	·50	67·8	2·12
2	Constitutional Group	129	3	—	3	64·0	1·48	76·0	1·94
	II.—*Local Diseases.*								
	Diseases of the—								
1	Nervous System	19	5	—	5	9·4	2·48	10·3	1·12
2	Eye	38	—	—	—	18·8	—	20·8	—
3	Ear	13	—	—	—	6·4	—	4·0	—
4	Nose	—	—	—	—	—	—	·4	—
5	Circulatory System	30	—	—	—	14·9	—	9·9	1·47
6	Absorbent „	14	—	—	—	6·9	—	12·0	—
8	Respiratory „	43	1	—	1	21·3	·50	37·0	·47
9	Digestive „	372	—	—	—	184·4	—	156·1	·83
10	Urinary „	57	—	—	—	28·3	—	28·8	·29
11	Generative „	14	—	—	—	6·9	—	8·0	—
12	Organs of Locomotion	7	—	—	—	3·5	—	3·1	·06
13	Cellular Tissue	31	—	—	—	15·4	—	26·5	·06
14	Cutaneous System	106	—	—	—	52·6	—	64·3	·06
	III.—*Conditions, &c.*								
	Debility	90	—	—	—	44·6	—	8·7	—
	IV.—*Poisons.*	16	—	—	—	7·9	—	17·2	·59
	V.—*Injuries.*								
2	Accidental	265	2	—	2	131·4	·99	117·5	1·12
4	Self-inflicted	1	—	—	—	·5	—	·5	·83
	Surgical Operations.	—	—	—	—	—	—	·1	—
	No appreciable disease	1	—	—	—	·5	—	·5	—
		1,325	12	—	12	656·9	5·95	669·5	10·96
	Average for 10 years, 1868–77	—	—	—	—	676·1	12·19	—	—

General Diseases.—The admission rate for diseases in this class is 1·8 per 1,000 men higher than in the preceding year; for the *febrile group* there is a decrease of 1·9 per 1,000; while in the *constitutional group* there is an increase of 3·7 per 1,000 men. The rate of deaths for the class is ·38 higher than in 1877.

Bermuda.

The admissions and deaths from the principal diseases in this class are shown in the following Table :—

Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength. 1878. Admitted.	1878. Died.	1869–77. Admitted.	1869–77. Died.
Febrile Group.						
Eruptive Fevers	—	—	—	—	·2	·06
Continued „	75	1	37·2	·50	58·4	2·00
Paroxysmal Fevers	2	—	1·0	—	1·1	—
Influenza	—	—	—	—	7·5	—
Erysipelas	2	—	1·0	—	·3	—
Other Diseases	—	—	—	—	·3	·06
Total of Febrile Group	79	1	39·2	·50	67·8	2·12
Constitutional Group.						
Rheumatism	47	—	23·3	—	36·0	—
Syphilis	65	—	32·2	—	29·9	·06
Scrofula, Phthisis, &c.	14	3	7·0	1·48	8·5	1·71
Scurvy and Purpura	2	—	1·0	—	—	—
Anæmia	1	—	·5	—	·9	·17
Other Diseases	—	—	—	—	·7	—
Total of Constitutional Group	129	3	64·0	1·48	76·0	1·94

Continued Fevers.—Enteric fever caused 9 admissions, and one attack was fatal, the case being complicated with tuberculosis. The insanitary condition of the town of St. George is considered a prominent factor in the causation of this disease by the Principal Medical Officer. *Simple continued fever* caused 1 admission only. *Febricula.*—There were 65 admissions for this form of fever, attributed in a great degree to intemperance.

Rheumatism.—The rate of admissions is 8·7 per 1,000 men less than in the preceding year.

Syphilis.—The rate of admissions is 11·4 higher than in 1877; 30 of the admissions were for primary and 35 for secondary affections, the cases occurring principally in a draft of the 46th Regiment, which arrived in November.

Scrofula, Phthisis, &c.—The rate of admissions is 1·1 per 1,000 men higher than in the preceding year; 10 of the admissions were for phthisis, 2 for scrofula, and 2 for tubercular hæmoptysis. The death rate is fractionally higher than in the preceding year.

Local Diseases.—*Diseases of the Nervous System.*—The rate of admissions is 2·3 lower than in 1877. Nine cases of sunstroke are shown as occurring in the months of July and August, when the heat was excessive, the men attacked being, as a rule, of intemperate habits and in a debilitated condition; two of

these cases terminated fatally, and two deaths occurred from abscess of the brain. There were 6 admissions for neuralgia.

Diseases of the Eye.—The rate of admissions is 6·8 per 1,000 men lower than in 1877; two-thirds of the admissions were for conjunctivitis.

Diseases of the Circulatory System.—The rate of admissions is fractionally lower than in the preceding year; 10 were cases of valvular disease of the heart, and 17 were admitted for palpitation.

Diseases of the Respiratory System.—The rate of admissions is 16·0 per 1,000 men lower than in 1877. Nearly all the admissions were for bronchial catarrh and bronchitis. The death was from pneumonia.

Diseases of the Digestive System.—The rate of admissions is 41·9 per 1,000 men higher than in the preceding year; 162 of the admissions were for dyspepsia, which prevailed most among the old soldiers, and is said to be principally due to the constant and habitual over-use of stimulants. 135 cases of diarrhœa are returned, the disease having been most prevalent amongst the young and immature soldiers, and most particularly so in the 19th Regiment, which had only recently arrived in the Command.

Diseases of the Urinary System.—The rate of admissions is fractionally less than in 1877.

POISONS.—The rate of admissions is fractionally lower than in the preceding year; 15 of the admissions were for delirium tremens, and 1 for lead palsy.

INJURIES.—*Accidental.*—The rate of admissions is lower by 6·8 per 1,000 men than in the preceding year. One of the deaths was caused by asphyxia by drowning; the other by fracture of the skull.

Self-inflicted.—The admission shown in this group was for "cut throat."

Officers.

In an annual average strength of 93 officers there were 48 attacks of illness. No death occurred, and 6 were invalided to England; the rates given by these numbers are, for attacks of illness 516·12, and for invaliding 64·51 per 1,000 of the strength respectively.

Women.

In an annual average strength of 178 wives of non-commissioned officers and men there were 39 attacks of illness, and no death; the rate of admissions being 219·10 per 1,000 of the strength.

Children.

In an annual average strength of 348 children of non-commissioned officers and men, 49 attacks of illness are returned, and 12 deaths occurred, being in the rate of 140·80 per 1,000 of strength for admissions, and 34·48 for the deaths. The death rate is 4·18 less than in the preceding year. The deaths were due to—whooping cough (1), hydrocephalus (1), convulsions (2), pneumonia (1), diarrhœa (4), general debility (3).

Bermuda.

Section II.

On the Extent of Invaliding.

Thirty-four invalids were sent home, and 10 were finally discharged the service during the year.

The proportion of primary invaliding is 2·88 per 1,000 lower than in the preceding year, whilst that of final invaliding is 9·45 per 1,000 lower.

The classes and orders of diseases to which invaliding was due are shown in the following Table :—

Orders.	Strength 2,017.	Invalids sent to England.	Invalids Discharged the Service.
	I. *General Diseases.*		
2	Constitutional Group - - -	5	4
	II. *Local Diseases.*		
	Diseases of the—		
1	Nervous System - - -	1	—
2	Eye - - - - -	2	1
5	Circulatory System - - -	7	3
9	Digestive System - - -	4	2
12	Organs of Locomotion - -	1	—
13	Cellular Tissue - - -	1	—
14	Cutaneous System - - -	1	—
	III. *Conditions, &c.*		
	Debility - - - - -	8	—
	V. *Injuries.*		
2	Accidental - - - -	1	—
	Total - - -	34	10
	Ratio per 1,000 of the Strength - - { 1878 - -	16·86	4·96
	{ 1868–77 -	22·61	18·59

Section III.

Mean Daily Sick.

The average number of non-commissioned officers and men constantly in hospital during the year was 71·27.

Certain particulars calculated from the number of constantly sick are shown in the following Table :—

	1878.	1868–77.
Ratio per 1,000 of strength constantly sick - -	35·33	32·92
	Days.	Days.
Average sick-time to each soldier - - - -	12·90	12·02
Average duration of each case of sickness - - -	19·63	17·77

Section IV. *Bermuda.*

On the Influence of Age on the Mortality.

The death rates of the non-commissioned officers and men at the several ages arranged in quinquennial periods are shown in the following Table:—

	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
	135	—	938	5	541	1	261	1	170	3	40	2
Ratio per 1,000 of strength. 1878	—		5·32		1·85		3·83		17·65		50·00	
Ratio per 1,000 of strength. 1868–77	2·63		6·90		11·64		19·17		24·37		17·94	

VI.—ON THE HEALTH OF THE TROOPS SERVING IN THE WEST INDIES.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

I. White Troops.

West Indies Command.

The average annual strength of non-commissioned officers and men was 1,119; the admissions into hospital were 1,124; there were 15 deaths in the Command; and the average number of daily sick was 59·96; the rate of admissions is therefore 1004·4, that of deaths 13·40, and that of daily sick 53·58 per 1,000 of the strength, respectively. The admission rate is in excess of that of the preceding year by 26·5 per 1,000 of the strength, the death rate is 2·48 lower, and the constantly sick 3·15 higher.

The troops in the Command consisted of the 18th Battery of the 9th Brigade, and the 5th Battery of the 10th Brigade, Royal Artillery, the 35th Regiment, detachments of the Royal Engineers and Army Hospital Corps, Garrison Staff, Sergeants of West Indian Regiments, and Military Labourers. The stations occupied were Barbados, Trinidad, and Jamaica.

The admissions and deaths in the various classes and orders of diseases are shown in the following Table:— *West Indies Command.*

Orders.	White Troops.	1878.						1869–77.	
	Diseases.	Strength, 1,119.				Annual Ratio per 1,000.		Annual Ratio per 1,000.	
		Admitted.	Deaths. In West Indies.	Deaths. Of Invalids.	Deaths. Total.	Admitted.	Died.	Admitted.	Died.
	I. *General Diseases.*								
1	Febrile Group	302	7	—	7	269·9	6·26	188·1	4·93
2	Constitutional Group	83	2	—	2	74·2	1·79	108·5	1·76
	II. *Local Diseases.*								
	Diseases of the—								
1	Nervous System	23	1	—	1	20·6	·89	11·3	·97
2	Eye	28	—	—	—	25·0	—	10·9	—
3	Ear	11	—	—	—	9·8	—	7·7	—
4	Nose	—	—	—	—	—	—	·3	—
5	Circulatory System	10	3	—	3	8·9	2·68	11·6	·97
6	Absorbent „	25	—	—	—	22·3	—	21·1	—
7	Ductless Glands	—	—	—	—	—	—	·2	—
8	Respiratory System	35	1	—	1	31·3	·89	32·7	·27
9	Digestive „	175	—	—	—	156·4	—	127·4	·70
10	Urinary „	73	—	—	—	65·2	—	94·1	·09
11	Generative „	28	—	—	—	25·0	—	15·5	—
12	Organs of Locomotion	4	—	—	—	3·6	—	5·6	—
13	Cellular Tissue	45	—	—	—	40·2	—	26·2	—
14	Cutaneous System	87	—	—	—	77·7	—	87·0	—
	III. *Conditions, &c.*								
	Debility	46	—	—	—	41·1	—	12·9	·17
	IV. *Poisons.*	3	1	—	1	2·7	·89	17·6	·44
	V. *Injuries.*								
1	Battle	—	—	—	—	—	—	—	—
2	Accidental	144	—	—	—	128·7	—	121·5	·70
3	Homicidal	—	—	—	—	—	—	—	—
4	Self-inflicted	2	—	—	—	1·8	—	·3	·27
5	Judicial	—	—	—	—	—	—	—	—
	VI. *Surgical Operations.*	—	—	—	—	—	—	·3	—
	No appreciable disease	—	—	—	—	—	—	·9	—
	Cause unknown	—	—	—	—	—	—	—	—
	Total	1,124	15	—	15	1004·4	13·40	901·7	11·27
	Ratio of 10 years, 1868–77	—	—	—	—	895·2	10·98	—	—

General Diseases show a lower rate of admission by 20·4 per 1,000 of the strength than in the preceding year, and the death rate is also lower by 1·66. The greatest mortality in this class is in the febrile group, all the deaths, except two, having occurred in it, and are due principally to an outbreak of yellow fever in Jamaica.

West Indies Command.

The admissions and deaths from the principal diseases in this class are shown in the following Table:—

White Troops.	Strength, 1,119.		Ratio per 1,000 of Strength.			
			1878.		1869–77.	
Diseases.	Admissions.	Deaths.	Admitted.	Died.	Admitted.	Died.
Febrile Group.						
Eruptive Fevers	—	—	—	—	·9	—
Continued „	246	1	219·8	·89	126·0	1·76
Yellow „	7	5	6·3	4·48	4·4	2·20
Paroxysmal „	48	1	42·9	·89	52·8	·97
Cholera	—	—	—	—	—	—
Influenza	—	—	—	—	1·9	—
Erysipelas	—	—	—	—	1·1	—
Other diseases	1	—	·9	—	1·0	—
Total	302	7	269·9	6·26	188·1	4·93
Constitutional Group.						
Rheumatism	26	—	23·2	—	22·1	-
Syphilis	52	—	46·5	—	67·8	—
Scrofula, Phthisis, &c.	5	2	4·5	1·79	8·5	1·76
Scurvy and Purpura	—	—	—	—	·2	—
Anæmia	—	—	—	—	9·3	—
Other diseases	—	—	—	—	1·1	—
Total	83	2	74·2	1·79	108·5	1·76

Enteric Fever.—There was but one admission, which was at Trinidad, it was complicated with pneumonia, and terminated fatally.

Simple Continued Fevers and Febricula were more prevalent than in the preceding year, the rate of admissions being 49·5 per 1,000 of the strength higher. There was, one death.

Yellow Fever.—The Principal Medical Officer states "there were 7 admissions "and 5 deaths. With the exception of one admission and one death these "cases occurred during a short outbreak of the disease which prevailed at Port "Royal, Jamaica, in the latter end of August and the first part of September." From his report on the subject two factors would seem to have been engaged in the origin of the epidemic, viz., climatic conditions and a very insanitary state of the town of Port Royal in immediate vicinity to the barracks, any evidence in support of importation of the disease being absent. The troops were soon removed to "Apostles Battery" on the opposite side of the harbour, with the good result that no further case occurred for the time. However, in the December following two further cases of the disease, both ending fatally, occurred at Port Royal, one in the person of a gunner of the Royal Artillery, and the other in the wife of a sergeant of the Royal Engineers. Upon which by the advice of the Senior Medical Officer, Jamaica, the white troops were a second time moved to "Apostles Battery," and again with the satisfactory result that the removal was followed by a total cessation of the disease.

Paroxysmal Fevers.—The admissions took place principally at Jamaica from remittent fever, the rate of that form of disease being 4·9 higher than in the preceding year, while the death rate was nearly the same.

Rheumatism was less prevalent by 4·1 per 1,000 of the strength than in the preceding year.

Syphilis shows a marked decrease, the rate of admissions being 55·9 per 1,000 men, or nearly half less than in 1877.

Phthisis, Scrofula, &c.—The rate of admissions is less by more than half than in the preceding year, but the death rate is a little higher. All of the admissions and the deaths were from phthisis. *West Indies Command.*

LOCAL DISEASES.—*Diseases of the nervous, digestive,* and *urinary systems,* and of the *eye* and *ear* and *cellular tissue* were more prevalent, and those of the other groups were less so than in the preceding year. Four deaths occurred, viz., two from fatty degeneration of the heart at Jamaica, one from saccular aneurism, and one from pneumonia at Barbados.

CONDITIONS.—*Debility.*—The rate of admissions is 41·1 per 1,000 men, or nearly double that of the preceding year.

POISONS.—There were three admissions. All for delirium tremens.

INJURIES.—The rate of admissions is 130·5 per 1.000 of the strength, being 8·94 higher than in 1877.

II. BLACK TROOPS.

The Black Troops serving in the Command consisted of 1st West India Regiment, a wing of 2nd West India Regiment, and a detachment of the corps of Military Labourers.

The stations occupied were Barbados, Jamaica, Nassau, and Honduras by the 1st West India Regiment, and Demerara and Tobago by the detachment of the 2nd West India Regiment.

The company at Tobago was, however, withdrawn early in October to Demerara.

The average annual strength of the non-commissioned officers and men (exclusive of White Staff Sergeants) was 1,116; the admissions into hospital were 1,257; the deaths 12; and the average number constantly sick 60·17. The proportions given by these numbers are, for admissions, 1126·3; for deaths, 10·75; and for constantly sick, 53·92 per 1,000 of the strength, respectively. Contrasted with the preceding year the admission rate is 52·0 per 1,000 higher, the death rate 8·85 lower, and that of constantly sick ·79 higher.

West Indies Command.

The admissions in the different classes and orders of diseases are shown in the following Table :—

Orders.	Diseases.	Black Troops. 1878. Strength, 1,116. Admitted.	Died.	Ratio per 1,000. Admitted.	Died.	1869–77. Ratio per 1,000. Admitted.	Died.
	I. *General Diseases.*						
1	Febrile Group - -	331	2	296·6	1·78	189·9	2·40
2	Constitutional Group -	245	6	219·5	5·37	242·5	8·63
	II. *Local Diseases.*						
	Diseases of the—						
1	Nervous System -	12	—	10·8	—	18·5	1·19
2	Eye - - -	23	—	20·6	—	17·2	—
3	Ear - - -	5	—	4·5	—	2·7	—
4	Nose - - -	2	—	1·8	—	·7	—
5	Circulatory System -	5	—	4·5	—	9·1	1·62
6	Absorbent „ -	29	—	26·0	—	21·6	—
7	Ductless Glands -	—	—	—	—	—	—
8	Respiratory System -	71	—	63·6	—	58·5	2·40
9	Digestive „ -	93	1	83·3	·90	90·5	1·45
10	Urinary „ -	170	1	152·3	·90	143·8	·85
11	Generative „ -	19	—	17·0	—	22·6	—
12	Organs of Locomotion -	9	—	8·1	—	10·4	·34
13	Cellular Tissue -	23	1	20·6	·90	23·2	·08
14	Cutaneous System -	79	—	70·8	—	82·9	—
	III. *Conditions, &c.*						
	Debility - -	18	—	16·1	—	4·6	·17
	IV. *Poisons.*	—	—	—	—	2·7	—
	V. *Injuries.*						
1	Battle - - -	—	—	—	—	1·1	·17
2	Accidental - -	121	—	108·4	—	95·2	·60
3	Homicidal - -	—	—	—	—	—	—
4	Self-inflicted - -	—	—	—	—	·2	·26
5	Judicial - - -	—	1	—	·90	—	—
	VI. *Surgical Operations.*	1	—	·9	—	·9	—
	No appreciable disease -	1	—	·9	—	·8	·08
	Cause unknown - -	—	—	—	—	—	—
	Total - -	1,257	12	1126·3	10·75	1039·6	20·24

General Diseases.—The rate of admissions for diseases of this class is 516·1 per 1,000 of the strength, or 4·3 more than in 1877, and that of deaths is 7·15, or 6·27 less. The *febrile group* gives a lower rate of admissions by 10·9, and of deaths by 2·35 per 1,000 of strength; and the *constitutional group* a higher rate of admissions by 15·2 and a lower rate of deaths by 3·92 than in the preceding year.

The admissions and deaths from the principal diseases of this class are shown in the following Table:— *West Indies Command.*

Black Troops. Diseases.	Strength, 1,116.		Ratio per 1,000 of Strength.			
			1878.		1869–77.	
	Admissions.	Deaths.	Admitted.	Died.	Admitted.	Died.
Febrile Group—						
Eruptive Fevers	2	—	1·8	—	4·7	·09
Continued „	197	1	176·5	·89	49·3	·68
Yellow „	1	1	·9	·89	·6	·09
Paroxysmal „	131	—	117·4	—	127·8	1·45
Cholera	—	—	—	—	—	—
Influenza	—	—	—	—	1·1	—
Erysipelas	—	—	—	—	·3	—
Other Diseases	—	—	—	—	6·1	·09
Total	331	2	296·6	1·78	189·9	2·40
Constitutional Group—						
Rheumatism	76	—	68·1	—	68·2	·09
Syphilis	155	2	138·9	1·79	146·4	·17
Scrofula, Phthisis, &c.	11	4	9·8	3·58	25·4	8·28
Scurvy and Purpura	—	—	—	—	·2	—
Anæmia	1	—	·9	—	1·5	—
Other Diseases	2	—	1·8	—	·8	·09
Total	245	6	219·5	5·37	242·5	8·63

Eruptive Fevers.—Two cases of chicken pox are returned, one occurred at Jamaica and the other at Nassau.

Continued Fevers.—The rate of admissions exceeds that of 1877 by 95 per 1,000. There was one death at Jamaica.

Yellow Fever.—One case occurred at Port Royal, Jamaica, in a private of the 1st West India Regiment during a short epidemic of the disease which prevailed among the Royal Artillery in August at that Station, the case was of a malignant type, and proved fatal.

Paroxysmal Fevers.—The rate of admissions is less by 83·8 per 1,000 of strength than in the preceding year. No death occurred.

Rheumatism.—The rate of admissions exceeds that of the preceding year by 18·6 per 1,000 of the strength.

Syphilis.—The rate of admissions is higher by 3·7 per 1,000 of the strength than in 1877. 101 of the admissions were for primary, and 54 for secondary affections. Two deaths occurred from secondary syphilis, but particulars of the cases have not been furnished.

Scrofula and Phthisis.—The rates of admissions and deaths are lower by 6·7 and 5·71 respectively than in 1877. All the fatal cases were from phthisis.

Local Diseases.—The admission rates for *diseases of the eye, the ear, the circulatory, absorbent, respiratory,* and *digestive systems,* and of the *organs of locomotion,* are higher than in the preceding year, while those for *diseases of the nervous, urinary, generative,* and *cutaneous systems* and of the *cellular tissue* are lower. The deaths in this class were three in number, one from acute Bright's disease, one from dysentery, and one from abscess.

Conditions, &c.—Debility.—The admission rate is 12 per 1,000 of the strength higher than in the preceding year.

Injuries.—*Judicial.*—The death was by hanging for murder.

West Indies Command.

Section II.

On the Extent of Invaliding.

Seven non-commissioned officers and men of the White Troops were invalided home, and 15 invalids from the Command were finally discharged, the majority of them having come home during the preceding year, but too late to be finally disposed of.

Thirty-seven of the Black Troops were discharged in the Command during the year.

		White Troops.		Black Troops.
		West Indies Command.		West Indies and West Africa Settlements Commands.
	Mean Strength	1,119.		1,658.
	Classes of Disabilities.	Invalids sent Home.	Finally Discharged.	Discharged as Invalids in the Colonies.
	I. *General Diseases.*			
1	Febrile Group	1	—	—
2	Constitutional Group	2	7	37
	II. *Local Diseases.*			
	Diseases of the—			
1	Nervous System	—	—	4
2	Eye	—	—	4
4	Nose	—	—	—
5	Circulatory System	1	—	1
8	Respiratory „	—	1	1
9	Digestive „	1	3	2
10	Urinary „	—	—	3
11	Generative „	—	—	1
12	Organs of Locomotion	1	—	2
13	Cellular Tissue	—	—	1
	III. *Conditions, &c.*			
	Debility	1	1	6
	V. *Injuries.*			
2	Accidental	—	1	2
	Total	7	15	64
	Ratio per 1,000 of mean strength — 1878	6·26	13·40	38·60
	Ratio per 1,000 of mean strength — 1868–77	23·84	12·91	19·24

Section III.

Mean Daily Sick.

The average number of White Soldiers constantly in hospital was 59·96; of Black Soldiers the number was 60·17.

Compared with the preceding year this gives an increase of 3·15 per 1,000 constantly sick for the former and of ·79 for the latter.

The usual information calculated from the number of constantly sick is given in the following Table :—

		White Troops.	Black Troops.
Ratio per 1,000 of the strength constantly sick	1878	53·58	58·92
	1868–77	40·58	55·64
		Days.	Days.
Mean sick time to each soldier	1878	19·56	19·68
	1868–77	14·81	20·31
Average duration of each case of sickness	1878	19·47	17·47
	1868–77	16·46	19·69

Section IV.

On the Influence of Age on the Mortality.

The death rates of the non-commissioned officers and men at the several ages, arranged in quinquennial periods, are shown in the following Table :—

	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
	25	1	456	6	386	3	95	4	84	1	37	—
Ratio per 1,000 of strength 1878	40·00		13·16		7·77		42·11		11·90		—	
Ratio per 1,000 of strength 1868–77	5·70		11·13		12·10		11·06		13·82		84·51	

VII.—ON THE HEALTH OF THE TROOPS SERVING IN THE WEST AFRICA COMMAND.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

1. White Troops.

West Africa. The average annual strength of the European non-commissioned officers serving in the Command was 12; the admissions into hospital among them were 21; no death occurred; two staff-sergeants were invalided. Most of the admissions were for paroxysmal fevers.

2. Black Troops.

The Black Troops in the Command consisted of the 2nd West India Regiment, and the stations occupied were Sierra Leone and Cape Coast.

The average annual strength of the troops was 542 non-commissioned officers and men, amongst whom there were 756 admissions into hospital, 6 deaths, and an average constantly sick of 35·96. The rates given by these numbers are, for admissions, 1394·8, for deaths, 11·08, and for constantly sick 66·35 per 1,000 of the strength respectively. The rate of admissions is 320·8, and that of deaths is 7·66 per 1,000 men lower than in the preceding year; the constantly sick rate is also lower by 2·99 per 1,000 men.

For the Sierra Leone station the admission rate is 1406·1, the death rate 8·28, and the constantly sick rate 72·10 per 1,000 of the mean strength.

For the Cape Coast station the admission rate is 1372·22, the death rate 16·67, and the constantly sick rate 54·78 per 1,000 of the mean strength.

The admissions and deaths in each class, and in each order of diseases, are shown in the following Table:— *West Africa.*

Orders.	Black Troops. Diseases.	1878. Strength 542. Admitted.	1878. Strength 542. Died.	1878. Ratio per 1,000. Admitted.	1878. Ratio per 1,000. Died.	1869–77. Ratio per 1,000. Admitted.	1869–77. Ratio per 1,000. Died.
	I.—*General Diseases.*						
1	Febrile Group	223	—	411·4	—	514·0	5·10
2	Constitutional Group	165	1	304·4	1·85	265·4	7·26
	II.—*Local Diseases.*						
	Diseases of the—						
1	Nervous System	13	2	24·0	3·69	15·7	2·36
2	Eye	14	—	25·8	—	21·8	—
3	Ear	5	—	9·2	—	4·5	—
4	Nose	—	—	—	—	·6	—
5	Circulatory System	11	—	20·3	—	8·2	·98
6	Absorbent „	12	—	22·1	—	18·8	—
7	Ductless glands	—	—	—	—	—	—
8	Respiratory System	38	2	70·1	3·69	88·5	3·53
9	Digestive „	75	1	138·4	1·85	192·9	7·85
10	Urinary „	59	—	108·9	—	119·7	·79
11	Generative „	11	—	20·3	—	23·8	—
12	Organs of Locomotion	8	—	14·8	—	13·3	·39
13	Cellular Tissue	15	—	27·7	—	45·0	·39
14	Cutaneous System	52	—	95·9	—	132·9	—
	III.—*Conditions, &c.*						
	Debility	10	—	18·5	—	13·9	·20
	IV.—*Poisons*	—	—	—	—	1·0	—
	V.—*Injuries.*						
1	Battle	—	—	—	—	13·7	1·37
2	Accidental	42	—	77·5	—	85·8	·79
3	Homicidal	—	—	—	—	·2	·20
4	Self inflicted	—	—	—	—	·8	—
5	Judicial	—	—	—	—	·6	—
	VI.—*Surgical Operations.*	1	—	1·8	—	·4	—
	No appreciable disease	2	—	3·7	—	·4	—
	Cause unknown	—	—	—	—	1·0	—
	Total	756	6	1394·8	11·08	1582·9	31·21
	Average of 10 years 1868–77			1530·4	30·90		

GENERAL DISEASES.—The rate of admissions for this class of diseases is 237·4 per 1,000 men lower than that for 1877; for the *febrile group* it is 174·6 less, and for the *constitutional group* 62·8 less. The rate of mortality for the whole class is lower by 7·52, there having been but one death, which occurred in the constitutional group.

West Africa.

The admissions and deaths from the principal diseases in this class are shown in the following Table :—

Black Troops.			Ratio per 1,000 of Strength.			
			1878.		1873–77.	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Febrile Group.						
Eruptive Fevers -	—	—	—	—	·3	—
Continued „ -	12	—	22·1	—	·6	—
Yellow Fever -	—	—	—	—	—	—
Paroxysmal Fevers -	209	—	385·6	—	227·5	·64
Cholera - -	—	—	—	—	—	—
Influenza - -	—	—	—	—	·6	—
Erysipelas - -	2	—	3·7	—	—	—
Other Diseases - -	—	—	—	—	8·0	—
Total - - -	223	—	411·4	—	237·0	·64
Constitutional Group.						
Rheumatism - -	60	—	110·7	—	53·0	—
Syphilis - -	94	—	173·4	—	104·6	—
Scrofula, Phthisis, &c. -	8	1	14·8	1·85	16·9	4·15
Scurvy and Purpura -	—	—	—	—	—	—
Anæmia - -	2	—	3·7	—	·6	—
Other Diseases - -	1	—	1·8	—	2·9	·32
Total - - -	165	1	304·4	1·85	178·0	4·47

Continued Fevers.—The rate of admissions is 20·5 higher than that for 1877. Of the 12 cases shown in the table, 11 were for febricula and one for simple continued fever.

Paroxysmal Fevers.—The rate of admissions is 195·7 per 1,000 men lower than in the preceding year, and no death occurred. There is no marked difference in the rate of prevalence of these fevers in the two divisions of the Command.

Rheumatism.—The rate of admissions is 4·4 per 1,000 men higher than in 1877.

Syphilis.—The rate of prevalence is 53·1 per 1,000 men lower than for the preceding year.

Scrofula and Phthisis.—The rate of admissions is less by nearly half than that for last year, and the death rate is lower by 5·96 per 1,000 men.

Local Diseases.—*Diseases of the Nervous System.*—The rate of admissions is 9·9, and that of deaths 2·13 higher than in the preceding year; the two deaths in this order were due to cerebral hæmorrhage. Compared with the preceding year, the rate of admissions is higher for *diseases of the circulatory, digestive,* and *generative systems,* and for the *organs of locomotion;* but lower for diseases of the *absorbent, respiratory, urinary,* and *cutaneous systems,* and for affections of the *eye, the ear,* and *cellular tissue.* The two deaths in the diseases of the respiratory system were from pneumonia and pleurisy, and that in diseases of the digestive system from hepatitis.

Debility.—The rate of admissions is lower by 8·1 per 1,000 men than in the preceding year.

Injuries.—*Accidental.*—The rate of admissions is lower by 30·3 per 1,000 of the strength than in 1877.

Officers.

In an average annual strength of 30 officers, there were 71 attacks of illness, being in the rate of 2366·66 per 1,000 of the strength; there was no death; eight were invalided home.

Women.

In an average annual strength of 55 women, wives of the non-commissioned officers and men (of West Indian or African origin), there were 129 attacks of illness, being in the rate of 2345·5 per 1,000 of the strength; the bulk of the admissions were for paroxysmal fevers; no death is recorded.

Children.

In an average annual strength of 47 children of non-commissioned officers and men, there were 62 attacks of illness, being in the rate of 1319·15 per 1,000 of the strength; 37 of the admissions were due to paroxysmal fevers, and 8 to diarrhœa and dysentery; there was no death.

VIII.—ON THE HEALTH OF THE TROOPS SERVING AT THE CAPE OF GOOD HOPE AND AT ST. HELENA.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

Cape of Good Hope and St. Helena.

The average annual strength of the non-commissioned officers and men was 5,629, of which 181 were stationed at St. Helena. The admissions into hospital (in both portions of the Command) were 5,213; the deaths were 111 (inclusive of those of 2 invalids who died at Netley or on their voyage home); and the average number constantly sick was 267·49. The proportions given by these numbers are— for admissions, 926·1; for deaths, 19·72; and for constantly sick, 47·52 per 1,000 of the strength respectively. The admission rate is 92·5, that for the deaths 11·16, and that for the constantly sick ·70 higher than in 1877.

The troops stationed in the St. Helena portion of the Command consisted of a detachment of the 7th Brigade, Royal Artillery, No. 7 Company of the Royal Engineers, C Company of the 88th Regiment, which was relieved by F Company in December, and the garrison staff and departments. The average annual strength was 181, the admission rate 1110·49, and that of deaths 5·52 per 1,000 men.

The corps of which the force (in the Cape of Good Hope portion of the Command only) consisted, and certain of the most important of their health statistics, are shown separately in this Table, which is taken from the Report of the Principal Medical Officer:—

Corps.	Completed Years of Service in the Command.	Annual Average Strength.	Admitted into Hospital.	Died.			Invalids sent Home.*	Average Number constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each case of Sickness.
				In the Command.	Of Invalids.	Total.			Admitted.	Died.	Invalided.*	Constantly Sick.		
													Days.	Days.
Royal Artillery -	—	291	240	7	—	7	—	12·34	824·7	24·06	—	42·41	15·46	18·77
Royal Engineers	—	63	41	1	—	1	—	2·18	650·8	15·87	—	34·52	12·63	19·41
2/3rd Regiment -	2	641	614	3	—	3	—	28·24	957·9	4·68	—	44·06	16·08	16·79
1/13th „	3	702	641	9	—	9	—	23·22	913·1	12·82	—	33·08	12·07	13·22
1/24th „	4	733	595	25	—	25	—	28·77	811·7	34·11	—	39·25	14·33	17·65
2/24th „	12/13	712	641	22	1	23	—	40·41	900·3	32·30	—	56·76	20·72	23·01
80th „	2	758	693	9	—	9	—	42·83	914·3	11·87	—	56·50	20·62	22·56
88th „	2	684	826	12	1	13	—	48·42	1207·6	19·01	—	70·79	25·84	21·40
90th „	2/13	676	659	18	—	18	—	28·25	974·9	26·63	—	41·79	15·25	15·65
Garrison staff and departments.	—	88	62	2	—	2	—	3·18	704·5	22·73	—	36·14	13·19	18·72

* Information cannot be furnished by regiments.

Cape of Good Hope and St. Helena.

The admissions and deaths, in the various classes and orders of diseases, are shown in the following Table :—

Orders.	Diseases.	Strength, 5,629.				1878.		1869–77.	
			Deaths.			Annual Ratio per 1,000.		Annual Ratio per 1,000.	
		Admitted.	In the Command.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	I. *General Diseases.*								
1	Febrile Group	765	38	—	38	135·9	6·75	94·8	·79
2	Constitutional „	811	5	1	6	144·1	1·07	181·5	1·93
	II. *Local Diseases.*								
	Diseases of the—								
1	Nervous System	51	4	—	4	9·1	·71	11·8	1·10
2	Eye	175	—	—	—	31·1	—	39·6	—
3	Ear	31	—	—	—	5·5	—	5·0	—
4	Nose	1	—	—	—	·2	—	·3	—
5	Circulatory System	100	8	—	8	17·8	1·42	13·5	1·47
6	Absorbent „	93	—	—	—	16·5	—	18·1	—
7	Ductless Glands	1	—	—	—	·2	—	—	—
8	Respiratory system	248	10	—	10	44·0	1·78	32·3	·91
9	Digestive „	984	17	—	17	174·8	3·02	137·5	1·59
10	Urinary „	301	—	1	1	53·5	·18	136·8	·07
11	Generative „	55	—	—	—	9·8	—	12·4	—
12	Organs of Locomotion	42	—	—	—	7·5	—	4·9	·19
13	Cellular Tissue	175	—	—	—	31·1	—	24·8	—
14	Cutaneous System	479	—	—	—	85·1	—	82·9	—
	III. *Conditions, &c.*								
	Debility	88	—	—	—	15·6	—	8·2	·11
	IV. *Poisons.*	33	11	—	11	5·9	1·95	7·1	·30
	V. *Injuries.*								
1	Battle	20	5	—	5	3·5	·89	·1	·04
2	Accidental	740	7	—	7	131·4	1·24	130·2	1·25
3	Homicidal	—	1	—	1	—	·18	·2	·04
4	Self-inflicted	—	2	—	2	—	·35		·23
5	Judicial	3	—	—	—	·5	—	—	—
	VI. *Surgical Operations.*	8	1	—	1	1·4	·18	·4	—
	No appreciable disease.	9	—	—	—	1·6	—	·9	—
	Cause unknown	—	—	—	—	—	—	—	—
	Total	5,213	109	2	111	926·1	19·72	943·3	10·02
	Average of 10 years, 1868–77.	—	—	—	—	962·6	10·20	—	—

GENERAL DISEASES.—The rate of admissions is 23·4, and that of the deaths 5·41 higher than in 1877. The increase occurs in the febrile group only.

Cape of Good Hope and St. Helena.

The admissions and deaths from the principal diseases in this class are shown in the following Table:—

Diseases.	1878. Mean Strength, 5,629. Admitted.	Deaths. In the Command.	Deaths. Of Invalids.	Deaths. Total.	Ratio per 1,000. Admitted.	Ratio per 1,000. Died.	1869-77. Annual Ratio per 1,000 of the Strength. Admitted.	Died.
Febrile Group.								
Eruptive Fevers	2	—	—	—	·4	—	1·6	—
Continued „	594	34	—	34	105·5	6·04	44·1	·45
Yellow Fever	—	—	—	—	—	—	—	—
Paroxysmal Fevers	137	4	—	4	24·3	·71	26·6	·23
Cholera	9	—	—	—	1·6	—	18·4	—
Influenza	9	—	—	—	1·6	—		
Erysipelas	8	—	—	—	1·4	—	3·3	·11
Other Diseases	6	—	—	—	1·1	—	·8	—
Total	765	38	—	38	135·9	6·75	94·8	·79
Constitutional Group.								
Rheumatism	288	—	—	—	51·2	—	43·6	·04
Syphilis	473	—	—	—	84·0	—	128·2	·15
Scrofula, Phthisis, &c.	40	5	1	6	7·1	1·07	7·7	1·74
Scurvy and Purpura	1	—	—	—	·2	—	·1	—
Anæmia	7	—	—	—	1·2	—	1·1	—
Other Diseases	2	—	—	—	·4	—	·8	—
Total	811	5	1	6	144·1	1·07	181·5	1·93

Eruptive Fevers.—The 2 admissions were for measles at the Cape of Good Hope.

Continued Fevers.—The rate of admissions is 53·3, and the death rate 4·97, per 1,000 of the strength higher than in 1877. Out of a total of 594 admissions, enteric fever supplied 115, and 31 of the 34 deaths were returned as occurring from this form of disease, the prevalence of which was much greater than in the preceding year, and occurred chiefly in the months of March, April, and May. It is described by the Principal Medical Officer as a bastard form of fever which should more properly be called typho-malarial, and was prevalent amongst the troops engaged in the Galeaka wars. It commenced almost simultaneously in East London, King William's Town, and Fort Beaufort,

and gradually extended, in a lesser degree, to the camps in the Transkei and Ciskei. Some medical officers were of opinion that the contagium was conveyed from the towns named to the camps, but the Principal Medical Officer thinks it had an independent origin in the Transkei and Ciskei, and that it was due to the insanitary state of the ground in the vicinity of the several camps, brought about by the filthy habits of the native troops and camp followers. One case of typhus occurred and proved fatal at Cape Town. *Cape of Good Hope and St. Helena.*

Paroxysmal Fevers.—The rate of admissions is 7·7, and the death rate ·71 per 1,000 men higher than in the preceding year.

Erysipelas.—The rate of admissions is 1·8 per 1,000 men lower than in 1877.

Rheumatism.—The rate of admissions is fractionally higher than in the preceding year.

Syphilis.—The rate of admissions is 35·3 per 1,000 men lower than that for 1877. The decrease is due to the employment of the troops on field service at the Cape of Good Hope.

Scrofula and Phthisis.—The rate of admissions is 2·3 per 1,000 men higher than in the previous year, but the death rates are the same. Five of the deaths were from phthisis, and 1 from tubercular hæmoptysis.

Local Diseases.—*Diseases of the Nervous System.*—The admission rate is fractionally lower and the death rate fractionally higher than in the preceding year. Two of the deaths were from tetanus following wounds, 1 from paralysis, and 1 from meningitis.

Diseases of the Eye—The rate of admissions is 5 per 1,000 men lower than in 1877. At the Cape there were altogether 172 admissions, of which Utrecht furnished 54, Pietermaritzburg 41, Pretoria 34, and Cape Town 11 of the cases. The Senior Medical Officer at Utrecht reports, "Ophthalmia, chiefly conjunctivitis, prevailed to a considerable extent during the first three months of the year. Many of the cases were severe, and a few ended in loss of vision." It is attributed by one Medical Officer to bad and insufficient water supply, overcrowding in tents, and proximity to swamps; while another states that cases occurred when these factors were removed and the sanitary condition of the camp was satisfactory. At Pretoria it is attributed to the dust and glare, but at Pietermaritzburg, where hot winds and clouds of dust during the spring and summer months are frequent, the disease does not seem to be attributed to them. Conjunctivitis is always very prevalent during the autumnal months among the civil population in most of the large towns.

Diseases of the Circulatory System.—The rate of admissions was 1·4, and that of the deaths ·89 per 1,000 men higher than in the preceding year. Six of the deaths were from valvular disease of the heart, 1 from aneurism of the aorta, and 1 from syncope.

Diseases of the Respiratory System.—The rate of admissions is 15·4 and that of deaths ·44 higher than in 1877, which is due to exposure of the troops to wet and cold during the campaign at the Cape of Good Hope. Seven of the deaths were from pneumonia, and 3 from bronchitis.

Diseases of the Digestive System.—The rate of admissions is 58·4 and that of deaths 1·68 per 1,000 men higher than in the preceding year. The increase was owing to dysentery and diarrhœa, consequent upon service in the field. Thirteen of the deaths were due to dysentery, 2 to diarrhœa, 1 to hepatitis, and 1 to obstruction of the bowels.

Diseases of the Urinary System.—The rate of admissions is 9·9 per 1,000 men lower than in 1877.

Diseases of the Cutaneous System.—The rate of admissions is 2·6 per 1,000 of the strength lower than in the preceding year.

Conditions, &c.—*Debility.*—The rate of admissions is 4·1 per 1,000 men higher than in 1877, the increase being due, no doubt, to the hardships and fatigues of a campaign.

Poisons.—The rate of admissions is 1·9 per 1,000 of the strength lower than in the preceding year, but the death rate is 1·68 higher. No less than 9 of the 11 deaths are returned as having been caused directly by alcohol, 1

Cape of Good Hope and St. Helena.

is placed under the head of delirium tremens, and another was due to eating mussels.

INJURIES.—*Battle.*—There were 20 admissions under this head, and 5 deaths; 19 were from gunshot wounds, and 1 from assegai wound. Two were killed in action, and 3 died in hospital.

Accidental.—The rate of admissions is fractionally higher and that of deaths fractionally lower than in 1877. Six of the 7 deaths occurred at the Cape of Good Hope, and were due to the following causes: contusion from collision with pole of ox waggon (1), fracture of the skull by fall from horse (1), gunshot wound (1), asphyxia by drowning (1), rupture of small intestines (1), multiple injury (1). The other death was at St. Helena, and was caused by exposure to cold.

Homicidal.—A lance sergeant was shot in his tent, at Pretoria, by a private.

Self-inflicted.—The 2 cases shown under this head were the result of gunshot wounds.

Judicial.—There is no information given as to the causes of the 3 admissions under this head.

Surgical Operations.—Of the 8 operations, 3 were amputations of the thigh, 1 of the leg, and 3 of the fingers, and 1 excision of the elbow joint. Two of the amputations of the thigh and the excision of the elbow joint were necessitated by gunshot wounds; the others were cases of accident occurring from waggons, &c. The fatal case resulted from amputation of the thigh after gunshot wound.

Officers.

The average annual strength of the officers serving in the Command was 240, amongst whom there were 100 attacks of illness, 3 deaths, and 17 were invalided to England, being in the annual rates of 416·67, of 12·50, and 70·83 per 1,000 of the strength respectively. The causes of death were: gunshot wound (1), enteric fever (1), pneumonia (1).

Women.

The average annual strength of the wives of the non-commissioned officers and men was 380, amongst whom 227 cases of illness occurred, being in the ratio of 597·36 per 1,000 of the strength. The deaths occurred from bronchitis and cancer of the uterus.

Children.

In a strength of 697 children of non-commissioned officers and men there were 385 admissions and 30 deaths, being in the rates of 552·37 and 43·04 per 1,000 of the strength respectively. The bulk of the deaths were due to bowel complaints.

Cape of Good Hope and St. Helena.

Section II.

On the Extent of Invaliding.

One hundred and forty-seven invalids were sent home from the Command (135 from the Cape and 12 from St. Helena), and 61 were finally discharged the service during the year, being in the rates of 26·11 and 10·84 per 1,000 of the strength respectively.

The classes and orders of the diseases which caused the invaliding of the year are shown in the following Table:—

Orders.	Disabilities.	Invalids sent to England from the Cape of Good Hope Command.	Invalids finally discharged the Service.
	I. *General Diseases.*		
2	Constitutional Group - - -	41	19
	II. *Local Diseases.*		
	Diseases of the—		
1	Nervous System - - -	20	5
2	Eye - - - - -	5	2
3	Ear - - - - -	1	2
5	Circulatory System - - -	29	18
6	Absorbent „ - - -	1	—
8	Respiratory „ - - -	7	2
9	Digestive „ - - -	12	2
10	Urinary „ - - -	5	—
11	Generative „ - - -	2	—
12	Organs of Locomotion - -	1	1
14	Cutaneous system - - -	2	2
	III. *Conditions, &c.*		
1	Debility - - - -	9	4
	V. *Injuries.*		
1	Battle - - - - -	1	—
2	Accidental - - - -	7	2
	VI. *Surgical Operations.*	4	2
	Total - - -	147	61
	Ratio per 1,000 of Mean Strength - - { 1878 -	26·11	10·84
	{ 1868–77 -	23·82	16·96

Compared with the invaliding for 1877, a higher rates is observed by 7·65 for the men sent home, while the rate for those finally discharged is 1·20 lower.

Cape of Good Hope and St. Helena.

Section III.

Mean Daily Sick.

The average number constantly sick was 267·49, being in the rate of 47·52 per 1,000 of the strength.

The usual information calculated from this number is given in the following Table:—

——	1878.	1868–77.
Ratio per 1,000 constantly Sick - -	47·52	46·80
	days.	days.
Average Sick time to each Soldier - -	17·35	17·08
Average duration of each case of Sickness -	18·73	17·74

Section IV.

Influence of Age on the Mortality.

As the Principal Medical Officer at the Cape has not furnished the necessary information, the usual table cannot be furnished this year.

IX.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF MAURITIUS.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

Mauritius.

In an average annual strength of 416 non-commissioned officers and men, there were 1,069 admissions into hospital, and 13 deaths (including that of an invalid sent home), being in the rates of 2569·7 and of 31·25 per 1,000 of the strength respectively. The average number constantly sick was 33·98, being in the rate of 81·68 per 1,000 of the strength. The admission rate is 243·4, the death rate is 7·94, and the constantly sick rate is 11·56 per 1,000 men higher than for the preceding year.

The composition of the force, and some of the health statistics of each arm, are shown in the following Table:—

Corps.	Completed Years of Service in the Command.	Average Annual Strength.	Admitted into Hospital.	Died.			Invalided Home.	Average Number of constantly Sick.	Ratio per 1,000 of Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.
				In Mauritius.	Of Invalids.	Total.			Admitted.	Died.	Invalided.	Constantly Sick.		
													Days.	Days.
10th Battery, 7th Brigade, Royal Artillery	2 1/12	108	240	3	—	3	5	9·65	2222·2	27·78	46·30	89·35	32·61	14·68
2nd Battalion, 3rd Foot	2½	217	656	9	1	10	12	14·35	3023·1	46·08	55·30	66·13	24·14	7·98
88th Foot	¾	72	169	—	—	—	—	9·89	2347·2	—	—	137·36	50·14	21·36
Departmental Corps, &c.	—	19	4	—	—	—	—	·09	210·5	—	—	4·74	1·73	8·21

Mauritius. The admissions and deaths in the various classes and orders of diseases are shown in the following Table:—

Order.	Diseases.	Strength, 416.				1878.		1869–77.	
			Deaths.			Annual Ratio per 1,000.		Annual Ratio per 1,000.	
		Admitted.	In Mauritius.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	I.—*General Diseases.*								
1	Febrile Group	589	4	—	4	1415·9	9·62	818·6	2·99
2	Constitutional Group	91	3	1	4	218·7	9·62	112·2	2·53
	II.—*Local Diseases.*								
	Diseases of the—								
1	Nervous System	9	—	—	—	21·6	—	12·5	·92
2	Eye	9	—	—	—	21·6	—	13·1	—
3	Ear	9	—	—	—	21·6	—	9·2	—
4	Nose	—	—	—	—	—	—	—	—
5	Circulatory System	11	—	—	—	26·4	—	13·4	1·61
6	Absorbent „	19	—	—	—	45·7	—	18·4	—
7	Ductless Glands	—	—	—	—	—	—	·5	—
8	Respiratory System	39	1	—	1	93·8	2·40	44·0	·69
9	Digestive „	67	3	—	3	161·1	7·21	202·0	4·15
10	Urinary „	52	—	—	—	125·0	—	62·9	—
11	Generative „	5	—	—	—	12·0	—	12·5	—
12	Organs of Locomotion	4	—	—	—	9·6	—	6·2	—
13	Cellular Tissue	20	—	—	—	48·1	—	31·3	—
14	Cutaneous System	42	—	—	—	101·0	—	65·9	—
	III.—*Conditions, &c.*								
	Debility	2	—	—	—	4·8	—	7·4	—
	IV.—*Poisons.*	3	—	—	—	7·2	—	20·0	·92
	V.—*Injuries.*								
1	Battle	—	—	—	—	—	—	—	—
2	Accidental	98	1	—	1	235·6	2·40	114·5	1·38
3	Homicidal	—	—	—	—	—	—	—	—
4	Self-inflicted	—	—	—	—	—	—	—	·23
5	Judicial	—	—	—	—	—	—	—	—
	VI.—*Surgical Operations.*	—	—	—	—	—	—	·2	—
	No appreciable disease	—	—	—	—	—	—	—	—
	Cause unknown	—	—	—	—	—	—	—	—
	Total	1,069	12	1	13	2569·7	31·25	1559·8	15·42
	Average of 10 years, 1868–77	—	—	—	—	1740·6	18·20	—	—

General Diseases.—Compared with the preceding year there is an increase of 263·9 per 1,000 men in the rate of admissions; of this, 206·1 per 1,000 is in the *febrile group*, and 57·8 in the *constitutional*. The rate of mortality is higher by 12·25 per 1,000 men, of which 4·96 is in the *febrile*, and 7·29 in the *constitutional group*.

The admissions and deaths from the principal diseases in this class are shown in the following Table:—

Diseases.	Admissions.	Deaths.	Ratio per 1,000 of Strength. 1878. Admitted.	1878. Died.	1869–77. Admitted.	1869–77. Died.
Febrile Group—						
Eruptive Fevers	—	—	—	—	·7	—
Continued „	6	2	14·4	4·81	57·6	—
Yellow Fever	—	—	—	—	—	—
Paroxysmal Fevers	571	2	1372·6	4·81	737·6	2·76
Cholera	—	—	—	—	—	—
Influenza	12	—	28·9	—	16·3	—
Erysipelas	—	—	—	—	·9	—
Other Diseases	—	—	—	—	·5	·23
Total	589	4	1415·9	9·62	813·6	2·99
Constitutional Group—						
Rheumatism	21	—	50·5	—	35·9	—
Syphilis	59	—	141·8	—	55·3	—
Scrofula, Phthisis, &c.	5	3	12·0	7·21	8·3	2·30
Scurvy and Purpura	—	—	—	—	·2	—
Anæmia	4	—	9·6	—	12·0	·23
Other Diseases	2	1	4·8	2·41	·5	—
Total	91	4	218·7	9·62	112·2	2·53

Continued Fevers.—Enteric fever caused 3 admissions, and 2 deaths. One of the cases occurred in the Royal Artillery at Fort George, and 2, the fatal ones, in the 2/3rd Regiment quartered in the Line barracks, the origin of the disease was obscure in all instances, and could not be attributed to any sanitary defect. There were 3 admissions for *Febricula.*

Paroxysmal Fevers.—The rate of admissions exceeds that of 1877 by 195·4 per 1,000 men; 563 of the admissions, were caused by *ague,* and 8 by *remittent fever;* the two deaths resulting from the latter disease. These fevers were most prevalent during the months of March, April, May, and June, the greatest number of admissions having occurred in May, and are attributed to an unusually early rainy season, and to the fact that the men were under canvas at Point d'Esay, undergoing musketry instruction, during the wettest season. The temperature of the air was also higher than it had been for 26 years previously.

Rheumatism.—The rate of admissions is 10·9 higher than in the preceding year. The cases are described as having been of a trivial nature.

Syphilis.—The rate of admissions is higher by 43·8 per 1,000 of the strength than in the preceding year. 42 of the admissions were for primary, and 17 for secondary disease.

Scofula and Phthisis.—The rate of admission is 5 per 1,000 men higher than in the preceding year, and the rate of mortality is also higher fractionally. The deaths were caused by *Phthisis Pulmonalis* (2), and *Tuberculosis* (1).

Local Diseases.—*Diseases of the Nervous System.*—The rate of admissions is 4 per 1,000 of the strength lower than in 1877.

Diseases of the Eye.—There were but 9 admissions, the rate per 1,000 is, however, more than double that for 1877.

Diseases of the Circulatory System.—The rate of admissions is 7·8 per 1,000 men higher than in the preceding year, 5 of the 11 cases admitted were for *palpitation.*

Mauritius.

Diseases of the Respiratory System.—The rate of admissions is almost identical with that for 1877; excepting 10, all were for bronchitis.

Diseases of the Digestive System.—The rate of admissions is 46·5 per 1,000 men lower than in the preceding year, but the death rate is higher fractionally. 2 of the deaths were due to hepatitis, and 1 to abscess of the liver.

Diseases of the Urinary System.—The rate of admissions is 19·6 per 1,000 men lower than in 1877.

INJURIES.—*Accidental.*—The rate of admissions is 72·4 per 1,000 men higher than in the preceding year. The death was due to asphyxia by drowning.

Officers.

In an average annual strength of 9·50 officers, there were 13 attacks of illness, and one death from malarious fever. Two were invalided to England, one for ague, and the other for epilepsy.

Women.

In an average annual strength of 33 women, the wives of non-commissioned officers and men, there were 33 attacks of illness and 2 deaths; 23 of the admissions were for ague, and the deaths were from remittent fever.

Children.

In an average annual strength of 68 children of non-commissioned officers and men, only 22 attacks of illness are returned, and three deaths. 16 of the admissions were for ague, and the deaths were due to ague, meningitis, and anasarca.

Section II.

On the Extent of Invaliding.

Seventeen invalids were sent home from the Command, and seven were finally discharged the service during the year.

The classes and orders of the diseases, which necessitated the invaliding, are shown in the following Table:—

Orders.	Diseases.	Invalids sent Home.	Invalids discharged the Service.
	I. *General Diseases.*		
1	Febrile Group	2	—
2	Constitutional Group	5	1
	II. *Local Diseases.*		
	Diseases of the—		
1	Nervous system	1	—
2	Eye	1	—
3	Ear	1	—
5	Circulatory system	1	—
8	Respiratory ,,	1	—
9	Digestive ,,	1	3
10	Urinary ,,	2	1
12	Organs of locomotion	1	—
	III. *Conditions, &c.*		
	Debility	1	—
	V. *Injuries.*		
2	Accidental	—	2
	Total	17	7
	Ratio per 1,000 of strength 1878	40·87	16·83
	Ratio per 1,000 of strength 1868–77	29·86	12·19

Compared with 1877 there is an increase of 12·90 per 1,000 men in the rate of primary invaliding, and of 9·84 in final invaliding. *Mauritius.*

Section III.

Mean Daily Sick.

The average number of men constantly sick was 33·98.

The usual information calculated from the number constantly sick is given in the following Table :—

—	1878.	1868–77.
Ratio per 1,000 of strength of constantly sick - -	81·68	51·42
	Days.	Days.
Mean sick time to each soldier - - - -	29·81	18·77
Average duration of each case of sickness - - -	11·60	10·78

The rate of constantly sick is 11·56 per 1,000 men higher than for the preceding year; the mean sick time to each soldier is 4·21 days longer; the average duration of each case of sickness is ·60 days longer.

Section IV.

On the Influence of Age on Mortality.

The death rates of the non-commissioned officers and men at the several ages arranged in quinquennial periods, are shown in the following Table :—

—	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
—	10	—	146	6	85	5	58	—	21	—	4	1
Ratio per 1,000 of the mean strength 1878 -	—		41·10		58·82		—		—		250·00	
Ratio per 1,000 of the mean strength 1868–77 -	5·85		10·00		24·84		27·59		27·03		16·13	

X.—ON THE HEALTH OF THE TROOPS SERVING IN THE ISLAND OF CEYLON.

Section I.

Sickness and Mortality.

STATISTICAL REPORT.

White Troops.

Ceylon.

THE average annual strength of the non-commissioned officers and men in the Command was 1,015; the admissions into hospital were 1,005; the deaths, including three of invalids at home, were 16; the average number of constantly sick was 48·89. The admission rate is therefore 990·1, the death rate is 15·76, and the constantly sick rate is 48·17 per 1,000 of the strength. The rate of admissions is 10·5 per 1,000 men higher than in the preceding year; the death rate is 1·88 lower, and the constantly sick rate is3·11 lower.

The corps which served in Ceylon in the year, and some of the most important of their health statistics, are shown in the following Table:—

Corps.	Completed Years of Service in the Command.	Average Annual Strength.	Admissions into Hospital.	Died.			Invalids sent Home.	Average Number of Constantly Sick.	Ratio per 1,000 of the Strength.				Average Sick Time to each Soldier.	Average Duration of each Case of Sickness.
				In Ceylon.	Of Invalids.	Total.			Admissions.	Deaths.	Invalided.	Constantly Sick.		
													Days	Days
Royal Artillery, 12th and 13th Batteries, 7th Brigade.	1	196	247	3	—	3	6	8·48	1260·2	15·31	30·61	43·26	15·79	12·54
57th Foot -	4	801	753	10	3	13	23	38·61	940·1	16·23	28·71	48·20	17·59	18·72
Departmental Corps, &c.	—	18	7	—	—	—	—	1·90	388·9	—	—	105·56	38·53	99·07

The admissions and deaths in the various orders of diseases are shown in the following Table:— *Ceylon.*

Orders.	White Troops. Diseases.	Strength, 1,015. Admitted.	Deaths. In Ceylon.	Deaths. Of Invalids.	Deaths. Total.	1878. Annual Ratio per 1,000. Admitted.	1878. Annual Ratio per 1,000. Died.	1869–77. Annual Ratio per 1,000. Admitted.	1869–77. Annual Ratio per 1,000. Died.
	I.—*General Diseases.*								
1	Febrile Group - -	206	3	—	3	203·0	2·96	143·5	2·91
2	Constitutional Group -	113	—	3	3	111·3	2·96	105·3	2·23
	II.—*Local Diseases.*								
	Diseases of the—								
1	Nervous System -	14	2	—	2	13·8	1·97	11·5	1·12
2	Eye - - -	14	—	—	—	13·8	—	35·0	—
3	Ear - - -	10	—	—	—	9·8	—	9·7	—
4	Nose - - -	—	—	—	—	—	—	·1	—
5	Circulatory System -	3	—	—	—	3·0	—	15·8	1·45
6	Absorbent „ -	55	—	—	—	54·2	—	35·9	—
7	Ductless Glands -	—	—	—	—	—	—	—	—
8	Respiratory System -	23	—	—	—	22·7	—	30·6	·45
9	Digestive „ -	176	6	—	6	173·4	5·91	246·7	5·70
10	Urinary „ -	74	—	—	—	72·9	—	79·6	·34
11	Generative „ -	27	—	—	—	26·6	—	26·3	—
12	Organs of Locomotion	4	—	—	—	3·9	—	4·8	—
13	Cellular Tissue -	18	—	—	—	17·7	—	24·9	—
14	Cutaneous System -	136	—	—	—	134·0	—	100·1	·11
	III.—*Conditions, &c.*								
	Debility - -	19	—	—	—	18·7	—	13·7	—
	IV.—*Poisons.*	8	—	—	—	7·9	—	14·3	·34
	V.—*Injuries.*								
1	Battle - - -	—	—	—	—	—	—	—	—
2	Accidental - -	105	1	—	1	103·4	·98	113·8	1·12
3	Homicidal - -	—	—	—	—	—	—	—	—
4	Self-inflicted - -	—	—	—	—	—	—	·1	·22
5	Judicial - -	—	—	—	—	—	—	—	—
	VI.—*Surgical Operations.*	—	—	—	—	—	—	·1	—
	No appreciable Disease	—	—	—	—	—	—	1·4	—
	Cause unknown -	—	1	—	1	—	·98	—	—
	Total - -	1,005	13	3	16	990·1	15·76	1013·2	15·99
	Average of 10 years 1868–77 - -	—	—	—	—	1022·3	16·49	—	—

GENERAL DISEASES.—The rate of admissions in this class exceeds that of the preceding year by 73·7 per 1,000 men; for the *febrile group* the increase is 69·2, for the *constitutional* 4·5 per 1,000 men. The rate of mortality for the whole class is lower by 4·29 per 1,000 men, the whole of the reduction being in the *febrile* group.

Ceylon.

The admissions and deaths from the principal diseases in this class are shown in the following Table:—

Diseases.	1878.		Annual Ratio per 1,000 of Strength.			
			1878.		1869–77.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Febrile Group.						
Eruptive Fevers	—	—	—	—	·3	—
Continued „	114	1	112·3	·99	67·4	1·45
Yellow Fever	—	—	—	—	—	—
Paroxysmal Fevers	83	—	81·8	—	68·3	1·01
Cholera	4	2	4·0	1·97	·6	·34
Influenza	5	—	4·9	—	4·9	—
Erysipelas	—	—	—	—	1·5	—
Other Diseases	—	—	—	—	·5	·11
Total	206	3	203·0	2·96	143·5	2·91
Constitutional Group.						
Rheumatism	18	—	17·7	—	23·6	—
Syphilis	82	—	80·8	—	63·9	·11
Scrofula, Phthisis, &c.	12	3	11·8	2·96	10·1	1·90
Scurvy and Purpura	1	—	1·0	—	·6	—
Anæmia	—	—	—	—	5·9	—
Other Diseases	—	—	—	—	1·2	·22
Total	113	3	111·3	2·96	105·3	2·23

Continued Fevers.—The rate of prevalence of fevers of this kind is 5·5 per 1,000 men higher than in 1877; the rate of deaths is 4·58 per 1,000 lower.

Enteric Fever.—Of the four admissions for this form of fever two occurred at Galle, and two at Colombo; one of the attacks at Galle was fatal; the disease could not be traced to any sanitary defect at either station.

Simple Continued Fever caused 46 admissions, but the cases seemed generally to have been of a mild form, yielding readily to treatment.

Febricula caused 64 admissions, a large proportion of the whole occurring at Galle.

Paroxysmal Fevers.—The rate of admissions is 64·1 per 1,000 of strength higher than in 1877, but there was no mortality. More than seven-eighths of the cases occurred at Trincomalee. The medical officer in charge of that station attributes the large number of these cases to "the unusually large rainfall "in 1878, and to the fact that the hot weather set in somewhat earlier than "usual."

Cholera.—There were four admissions, all at Colombo, where the disease was very prevalent among the civil population in the native town. Two of the cases proved fatal. Three of the admissions were from the same barrack room.

Rheumatism.—The rate of admissions is 19·4 per 1,000 men lower than in the preceding year.

Syphilis.—The rate of admissions is 24·1 per 1,000 men higher than in 1877. Seventy-one were cases of primary, 10 of secondary syphilis, and one of suppurating bubo.

Scrofula, Phthisis, &c.—The rate of admissions is 1·2 per 1,000 men lower than in the preceding year. Eight of the admissions were for phthisis, and four for tubercular hæmoptysis. The three deaths were from phthisis occurring among the invalids after leaving the Command.

LOCAL DISEASES.—*Diseases of the Nervous System.*—The rate of admissions is fractionally higher than in the preceding year. Five, of the 14 admissions shown, were for epilepsy.

Diseases of the Eye.—The rate of admissions is 15 per 1,000 men, or more than half less than in the preceding year.

Diseases of the Circulatory System.—The rate of admissions is three-fourths less than in 1877. Two of the admissions were for palpitation and one for valvular disease of the heart.

Respiratory System.—The rate of admissions is 5·2 lower than in the preceding year. Twenty-one of the admissions were for bronchitis.

Diseases of the Digestive System.—The rate of admissions is 49·4 per 1,000 men lower than in the preceding year; the rate of deaths is fractionally higher. The deaths were due to abscess of the liver (4), and dysentery (2).

Diseases of the Urinary System.—The rate of admissions is 10·7 per 1,000 of the strength lower than in 1877, excepting six, all were for gonorrhœa and gleet.

CONDITIONS, &C.—*Debility.*—The rate of admissions is 4·8 per 1,000 men higher than in the preceding year.

POISONS.—The rate of admissions is fractionally lower than in 1877. Four of the admissions were for alcoholic poisoning, two for delirium tremens, one for arsenical poisoning, and one for snake bite, which terminated by recovery although the symptoms were very grave; as the reptile escaped its species was not ascertained.

INJURIES.—*Accidental.*—The rate of admissions is fractionally higher than in 1877; the death was from asphyxia by strangulation, the man, while under the influence of drink having fallen asleep with his throat resting on the edge of the lid of a box.

Officers.

In an average annual strength of 42 officers there were 22 attacks of illness. No death occurred, but five were invalided to England. The admission rate is 523·80, and the invaliding rate is 119·04 per 1,000 of the strength. The diseases which caused the invaliding were gastritis (1), dyspepsia (1), general debility (2), and fracture of leg (1).

Women.

In an average annual strength of 64 women, the wives of non-commissioned officers and men, there are 26 attacks of illness, and three deaths returned. The deaths were due to phthisis, one; peritonitis, one; and puerperal mania, one.

Children.

In an average annual strength of 132 children of non-commissioned officers and men, there were 34 attacks of illness and 15 deaths; the latter are in the rate of 113·63 per 1,000 of the strength. Death was due to diarrhœa in four instances, to convulsions in three, to dentition in three, to encephalitis in one, hydrocephalus in one, dysentery in one, to tabes mesenterica in one, and premature birth in one. There was besides one death out of hospital from drowning.

NATIVE TROOPS.

The Native Troops consisted of a company of Gun Lascars distributed between the stations of Colombo, Trincomalee, and Galle. The annual average strength was 86, the admissions into hospital 74, and the deaths three, being in the rate of 860·46 and 34·88 per 1,000 of the strength respectively. The deaths were from pneumonia, cholera, and perineal abscess. No men were invalided.

Section II.

On the Extent of Invaliding.

Twenty-nine non-commissioned officers and men were invalided during the year, being in the rate of 28·57 per 1,000 of the strength; and of these 10 were finally discharged, being in the rate of 9·85 per 1,000.

Ceylon.

The classes and orders of diseases to which the invaliding of the year was due, are shown in the following Table :—

Strength, 1,015. Diseases.		Invalids sent to England.	Invalids discharged the Service.
I. *General Diseases.*			
2. Constitutional Group		12	3
II. *Local Diseases.*			
Diseases of the—			
1. Nervous System		8	2
2. Eye		1	—
5. Circulatory System		3	3
9. Digestive „		5	1
III. *Conditions, &c.*			
Debility		—	1
Total		29	10
Ratio per 1,000 of mean strength	1878	28·57	9·85
	1868–77	36·56	15·87

Section III.

Mean Daily Sick.

The average number of non-commissioned officers and men (White Troops) constantly sick was 48·89.

The usual information calculated from this number is given in the following Table :—

Ratio per 1,000 of the strength constantly sick	1878	48·17
	1868–77	50·08
		Days.
Mean sick time to each soldier	1878	17·58
	1868–77	18·28
Average duration of each case of sickness	1878	17·72
	1868–77	17·88

The rate of constantly sick is 3·11 per 1,000 men lower than last year, and the mean sick time to each soldier is also a little lower. The average duration of each case of sickness is 1·39 days lower than in 1877.

Section IV. *Ceylon.*

On the Influence of Age on the Mortality.

The death rates of the non-commissioned officers and men at the several ages, arranged in quinquennial periods, are shown in the following Table :—

—	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
	37	—	422	6	388	4	91	1	87	2	19	—
Ratio per 1,000 of strength { 1878 -	—		14·22		10·31		10·99		22·99		—	
Ratio per 1,000 of strength { 1868–77	3·91		12·75		12·34		16·27		32·55		106·67	

XI.—ON THE HEALTH OF THE TROOPS SERVING IN CHINA AND THE STRAITS SETTLEMENTS.

Section I.

Sickness and Mortality of the Troops in China and the Straits Settlements.

STATISTICAL REPORT.

I.—*White Troops.*

China and Straits Settlements.

In an average annual strength of 1,843 non-commissioned officers and men (White Troops), there were 2,036 admissions into hospital, and 24 deaths, including those of fivei nvalids at home; and the average number of constantly sick was 111·42. The admission rate is therefore 1104·7, the death rate is 13·02, and the constantly sick rate 60·46 per 1,000 of the strength respectively. The rate of admissions is 119·7 per 1,000 men higher than in the preceding year, the death rate is one per 1,000 lower, and the constantly sick rate is 17·52 per 1,000 higher.

The proportions in which the two divisions of the Command contributed to these results, are shown in the following Table:—

Stations.	Average Annual Strength.	Admissions into Hospital.	Died.			Invalided home.	Average Daily Sick.	Ratio per 1,000 of Strength.				Average Sick time to each Soldier.	Average duration of each case of Sickness.
			In the Command.	Of Invalids.	Total.			Admissions.	Deaths.	Invalided.	Average daily Sick.		
												Days.	Days.
Hong Kong -	921	876	9	3	12	135	67·09	951·1	13·03	146·57	72·84	26·59	27·95
Straits Settlements.	921	1,160	10	2	12	28	44·33	1259·5	13·03	30·40	48·13	17·61	13·98

The admission rate for the Hong Kong division of the Command is 34·3 per 1,000 men higher than in the preceding year, and the death rate is 5·01 higher.

For the Straits Settlements division the admission rate is 210·9 per 1,000 men higher, and the death rate 6·60 per 1,000 men lower than in the preceding year.

The Troops stationed in the Command during the year, were the 7th and 9th batteries of the 14th brigade of the Royal Artillery, a detachment of Royal Engineers, the 28th regiment, the 74th Highlanders, a detachment of the Army Hospital Corps, and a few non-commissioned officers and men of the Garrison Staff.

The admissions and deaths in the various classes and orders of diseases are shown in the following Table:—

Orders.	Diseases.	Strength 1,843. Admitted.	Died. In the Command.	Died. Of Invalids.	Died. Total.	1878. Annual Ratio per 1,000. Admitted.	1878. Annual Ratio per 1,000. Died.	1869–77. Annual Ratio per 1,000. Admitted.	1869–77. Annual Ratio per 1,000. Died.
	I. *General Diseases.*								
1	Febrile Group	386	3	—	3	209·5	1·62	397·8	1·93
2	Constitutional Group	285	4	3	7	154·6	3·80	111·9	1·93
	II.—*Local Diseases.*								
	Diseases of the—								
1	Nervous System	14	2	—	2	7·6	1·09	18·6	1·40
2	Eye	22	—	—	—	11·9	—	17·9	—
3	Ear	43	—	—	—	23·3	—	12·5	—
4	Nose	—	—	—	—	—	—	·5	—
5	Circulatory System	118	1	1	2	64·0	1·09	24·7	1·33
6	Absorbent „	26	—	—	—	14·1	—	16·4	—
7	Ductless Glands	—	—	—	—	—	—	—	—
8	Respiratory System	153	1	—	1	83·0	·54	48·4	1·18
9	Digestive System	282	3	1	4	153·0	2·17	261·2	3·99
10	Urinary „	226	—	—	—	122·6	—	85·3	·18
11	Generative „	37	—	—	—	20·1	—	19·8	—
12	Organs of Locomotion	3	—	—	—	1·6	—	4·1	·07
13	Cellular Tissue	43	—	—	—	23·3	—	28·8	—
14	Cutaneous System	146	—	—	—	79·2	—	90·2	—
	III.—*Conditions, &c.*								
	Debility	45	—	—	—	24·4	—	25·5	·26
	IV.—*Poisons.*	14	2	—	2	7·6	1·09	11·6	·93
	V.—*Injuries.*								
1	Battle	—	—	—	—	—	—	2·4	·13
2	Accidental	189	3	—	3	102·6	1·62	101·5	1·06
3	Homicidal	—	—	—	—	—	—	·1	·18
4	Self inflicted	1	—	—	—	·6	—	·3	·07
5	Judicial	—	—	—	—	—	—	·2	—
	VI.—*Surgical Operations.*	2	—	—	—	1·1	—	·3	—
	No appreciable disease	1	—	—	—	·6	—	2·7	—
	Cause unknown	—	—	—	—	—	—	—	—
	Total	2,086	19	5	24	1104·7	13·02	1282·7	14·49
	Average of 10 years, 1868–77	—	—	—	—	1289·7	15·01	—	—

GENERAL DISEASES.—The rate of admissions in the *febrile group* is fractionally lower than that of the preceding year, and the death rate is also fractionally lower. The *constitutional group* shows an increase of 62·3 and 3·32 per 1,000 in the admissions and deaths respectively.

China and Straits Settlements.

The admissions and deaths from the principal diseases in this class are shown in the following Table:—

General Diseases.	Admitted.	Died.	Ratio per 1,000 of Strength. 1878. Admitted.	1878. Died.	1869–77. Admitted.	1869–77. Died.
Febrile Group.						
Eruptive Fevers	1	—	·6	—	1·6	·07
Continued „	137	3	74·3	1·62	112·6	1·33
Yellow Fever	—	—	—	—	—	—
Paroxysmal Fevers	224	—	121·5	—	279·3	·33
Cholera	1	—	·6	—	·3	·20
Influenza	19	—	10·3	—	2·2	—
Erysipelas	3	—	1·6	—	1·4	—
Other Diseases	1	—	·6	—	·4	—
Total	386	3	209·5	1·62	397·8	1·93
Constitutional Group.						
Rheumatism	45	—	24·4	—	37·0	·07
Syphilis	141	—	76·5	—	62·7	·13
Scrofula, Phthisis, &c.	94	6	51·0	3·26	9·2	1·53
Scurvy and Purpura	—	—	—	—	·3	—
Anæmia	5	—	2·7	—	1·3	—
Other Diseases	—	1	—	·54	1·4	·20
Total	285	7	154·6	3·80	111·9	1·93

Eruptive Fevers.—The case of measles shown occurred at Hong Kong.

Continued Fevers.—The admission rate is 10·5 per 1,000 men higher and that of the deaths ·31 lower than in the preceding year.

Enteric Fever.—There were two admissions at Hong Kong, one of which terminated fatally.

Simple continued Fever.—Of the 56 admissions 29 are returned for Hong Kong, 23 for Tanglin, and 4 for Penang. Two cases proved fatal; one at Hong Kong, which was complicated with pneumonia, and one at Penang.

Febricula.—Of the 79 admissions for this form of fever, 48 took place at Hong Kong, 24 at Penang, four at Fort Canning, and three at Tanglin. The Medical Officer in charge at Hong Kong attributes the attacks of the disease to error in diet and drink rather than to climatic influences.

Paroxysmal Fevers.—The rate of admissions is 20·1 per 1,000 men lower than that of the preceding year; the great bulk of the cases occurred in the Straits Settlements, at Penang and Tanglin, and were nearly all in the 28th Regiment, which had been previously at Hong Kong, on leaving which it is said to have been impregnated with malaria. There was, however, no death from this form of disease.

Rheumatism.—The rate of admissions is 5·6 lower than in 1877.

Syphilis.—The rate of admissions is 29·2 per 1,000 men higher than in the preceding year. The Medical Officer in charge of the Station Hospital at Hong Kong states, "The Contagious Diseases Act can only be imperfectly "carried out owing to the exemption from visitation of the Chinese brothels "in use by the Chinese, and there can be no doubt that indirectly this favours "the propagation of the disease."

China and Straits Settlements.

Scrofula and Phthisis.—The rate of admissions is 51 per 1,000 men, or 37 per 1,000 higher than in the preceding year. Of the 94 admissions 91 were for phthisis and three for tubercular hæmoptysis, and no less than 87 of the cases of phthisis were admitted at Hong Kong. The Medical Officer, in charge of the Station Hospital, in referring to this unusual prevalence of the disease, states, "The unusual prevalence of this disease among the troops may be "accounted for by a combination of causes. 1st. The intemperate habits of "the men, both of the Royal Artillery and the 74th Regiment. 2nd. Among "the other powerful predisposing and aggravating causes of this disease and "its unusual prevalence in the garrison I place the night duties of the men, "who have not had a sufficient exemption from this, especially in a malarious "locality like Hong Kong. 3rd. The inferior physique of many of the troops, "and especially the drafts of the 74th Highlanders which joined at Singapore "during the year 1877, many of which were deficient in chest capacity."

LOCAL DISEASES.—*Diseases of the Nervous System.*—The rate of admissions is 3·5, and that of the deaths 1·33 per 1,000 lower than in the preceding year. There were two deaths, both out of hospital, one from apoplexy, and one from tetanus.

Diseases of the Eye.—The rate of admissions is higher than that for 1877 by 3·7 per 1,000 men.

Diseases of the Circulatory System.—The rate of admissions is 26·8 per 1,000 men higher than in the preceding year, and no less than 38 were invalided for diseases of the heart from Hong Kong. No satisfactory reason has been assigned for such an extraordinary prevalence of organic disease. Fifty-nine of the admissions were for palpitation.

Diseases of the Respiratory System.—The rate of admissions exceeds that of the preceding year by 41·9 per 1,000 men; the great bulk of the admissions was for bronchitis.

Diseases of the Digestive System.—The rate of admissions is 37·5 per 1,000 of the strength lower than in the preceding year, and the death rate is also fractionally lower.

Urinary System.—The rate of admissions is 24·4 per 1,000 men higher than in the preceding year.

CONDITIONS, &C.—*Debility.*—The rate of admissions is 1·2 per 1,000 men higher than in the preceding year.

POISONS.—The rate of admissions is fractionally lower than in the preceding year. The two deaths were from delirium tremens.

INJURIES.—*Accidental.*—The rate of admissions is 11·3 higher, than in the preceding year. There were three deaths, one from asphyxia by drowning; one from fracture of the ribs; and one from contusion of the head. *Self-inflicted.*—There was but one admission under this head. Not fatal.

Officers.

In an average annual strength of 79 there were 44 attacks of illness, being in the rate of 556·96 per 1,000 of the strength. No officer died during the year, but seven were invalided to England (being in the rate of 88·60 per 1,000); of these two were invalided for phthisis pulmonalis, one for enteric fever, one for dysentery, one for dyspepsia, one for gall stone, and one for debility.

Women.

In an average annual strength of 105 women, the wives of non-commissioned officers and men, there were 50 attacks of illness, and three deaths, being in the rate of 476·19 and 28·57 per 1,000 of the strength respectively. The deaths were due to enteric fever, simple continued fever, and pericarditis.

Children.

In an average annual strength of 196 children of non-commissioned officers and men, there were 60 attacks of illness, and 11 deaths, being in the rates of 306·12 and of 56·12 per 1,000 of the strength respectively. The deaths were from debility (3), dysentery (2), diarrhœa (2), convulsions (2), bronchitis (1), and spina bifida (1).

China and Straits Settlements.

Asiatic Troops.

The Asiatic Troops in the Command consisted of a company of Gun Lascars stationed at Hong Kong, having an average annual strength of 85 non-commissioned officers and men. The admissions into hospital were 68, being in the rate of 800 per 1,000 of the strength; and there was one death, being in the rate of 11·76 per 1,000 men. The death was from inflammation of the cellular tissue. None were invalided. The average number constantly sick was 3·26, being in the rate of 38·35 per 1,000 of the strength. The admissions were principally for ague and gonorrhœa.

Section II.

On the Extent of Invaliding.

The diseases which caused invaliding are shown in the following Table:—

	White Troops.	
Mean Strength	1843.	
Disabilities.	Sent to England as Invalids.	Discharged as Invalids.
I. *General Diseases.*		
1. Febrile group	2	—
2. Constitutional group	68	19
II. *Local Diseases.*		
Diseases of the—		
1. Nervous system	8	1
2. Eye	1	2
3. Ear	—	1
5. Circulatory system	43	29
8. Respiratory „	5	3
9. Digestive „	17	3
10. Urinary „	1	—
12. Organs of locomotion	2	2
14. Cutaneous system	1	—
III. *Conditions, &c.*		
Debility	12	10
V. *Injuries.*		
2. Accidental	3	2
Total	163	72
Annual ratio per 1,000 of mean strength — 1878	88·44	39·07
Annual ratio per 1,000 of mean strength — 1868–77	41·75	20·14

The rate of primary invaliding is 50·72 per 1,000 men higher than in the preceding year; that of final invaliding 21·18 higher.

Section III.

Mean Daily Sick.

The average number constantly sick of the European Troops was 111·42, and of the Asiatic Troops 3·26.

From these numbers the following particulars have been calculated :—

		European Troops.	Asiatic Troops.
Ratio per 1,000 of strength constantly sick	1878	60·46	38·35
	1868–77	49·55	50·63
		Days.	Days.
Average sick time to each soldier	1878	22·07	14·00
	1868–77	18·09	18·48
Average duration of each case of sickness	1878	19·97	17·50
	1868–77	14·02	18·30

Section IV.

On the influence of Age on the Mortality.

The death rates of the non-commissioned officers and men at the several ages, arranged in quinquennial periods, are shown in the following Table :—

	Under 20 Years.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.	Strength.	Died.
Total	96	—	651	4	634	7	379	2	160	4	43	2
Ratio per 1,000 of strength 1878	—		6·14		11·04		5·28		25·00		46·51	
Ratio per 1,000 of strength 1868–77	3·73		6·59		11·47		15·99		24·97		29·13	

XII.—ON THE HEALTH OF THE TROOPS SERVING IN INDIA.

Section I

Sickness and Mortality.

India.

The average annual strength of the non-commissioned officers and men in India was 56,109; the admissions into hospital were 88,919, and the deaths 1,251, of which 1,181 took place in India, and 70 (being those of invalids) on the passage or after arrival in England. The average number of constantly sick was 3,618·08. The rates from these numbers are, for admissions 1584·8, for deaths 22·30, and for constantly sick 64·48 per 1,000 of the strength.

The sickness for each of the three Commands is shown in the following Table:—

	Average Annual Strength.	Admitted into Hospital.	Deaths.			Invalided home.	Constantly sick.	Ratio per 1,000 of Mean Strength.				Average Sick time to each Soldier.	Average duration of each case of Sickness.
			In India.	Of Invalids.	Total.			Admitted.	Died.	Invalided.	Constantly sick.		
												Days.	Days.
Bengal -	35,347	56,542	748	36	784	1,511	2302·66	1599·6	22·18	42·75	65·14	23·78	14·87
Madras	10,880	14,537	253	20	253	498	678·42	1336·1	23·25	45·77	62·35	22·76	17·03
Bombay	9,882	17,840	200	14	214	578	637·00	1805·3	21·65	58·49	64·46	23·53	13·03
Total -	56,109	88,919	1,181	70	1,251	2,587	3618·08	1584·8	22·30	46·11	64·48	23·54	14·85

1.—Bengal.

STATISTICAL REPORT.

Bengal.

In an average annual strength of 35,347 non-commissioned officers and men, there were 56,542 admissions into hospital, the deaths, (including those of invalids on their passage home or after their arrival in England) amounted to 784, and the average number constantly sick was 2302·66. The admission rate is therefore 1599·6, that of the deaths 22·18, and of the constantly sick 65·14 per 1,000 of the strength, which compare very unfavourably with the preceding year, being respectively 372·1, 9·63, and 12·67 higher. The strength is lower than that for 1877 by 1,319, which difference is accounted for by the fact that the advance into Afghanistan took place in November, and as the troops crossed the frontier they were struck off the actual strength of the Bengal Command.

The admissions and deaths in the different classes of diseases are shown in the following Table:— *Bengal.*

Orders.	Diseases.	Strength 35,347.				Annual Ratio per 1,000.			
			Deaths.			1878.		1869–77.	
		Admitted.	In the Command.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	I. *General Diseases.*								
1	Febrile Group - -	23,508	373	—	373	665·1	10·55	595·5	7·47
2	Constitutional Group -	5,852	46	13	59	165·5	1·67	154·8	2·08
	II. *Local Diseases.*								
	Diseases of the—								
1	Nervous System -	784	64	5	69	20·8	1·95	20·5	2·27
2	Eye - - -	637	—	—	—	18·0	—	21·9	—
3	Ear - - -	322	1	—	1	9·1	·03	7·7	—
4	Nose - - -	23	—	—	—	·7	—	·7	·01
5	Circulatory System -	544	32	3	35	15·4	·99	20·3	1·45
6	Absorbent „ -	570	—	—	—	16·1	—	14·8	·02
7	Ductless Glands -	5	—	—	—	·1	—	·1	
8	Respiratory System -	1,974	28	3	31	55·9	·88	57·1	1·11
9	Digestive „ -	8,278	142	9	151	234·2	4·27	237·9	4·88
10	Urinary „ -	6,012	6	3	9	170·1	·25	106·2	·32
11	Generative „ -	541	—	—	—	15·3	—	14·8	—
12	Organs of Locomotion -	142	—	—	—	4·0	—	5·1	·05
13	Cellular Tissue -	524	—	—	—	14·8	—	12·9	·02
14	Cutaneous System -	2,470	1	—	1	69·9	·03	66·7	·01
	III. *Conditions, &c.*								
	Debility - -	1,087	3	—	3	30·8	·09	19·9	·07
	IV. *Poisons.*	118	13	—	13	3·3	·37	4·2	·27
	V. *Injuries.*								
1	Battle - - -	1	—	—	—	88·4	—	89·3	—
2	Accidental - -	3,123	17	—	17		·48		·83
3	Homicidal - -	—	—	—	—	—	—		·06
4	Self-inflicted - -	10	22	—	22	·3	·62	·3	·55
5	Judicial - -	7	—	—	—	·2	—		·02
	VI. *Surgical Operations.*	18	—	—	—	·5	—	·4	·02
	No appreciable Disease	41	—	—	—	1·1	—	·8	—
	Cause unknown -	1	—	—	—		—	·1	·01
	Total - -	56,542	748	86	784	1599·6	22·18	1452·0	21·52
	Average for 10 years, 1868–77 - -	—	—	—	—	1444·6	21·65	—	—

Bengal.

GENERAL DISEASES.—The rate of admissions is higher in the *febrile group* by 255·9, and the death rate by 7·82 per 1,000 men than in the preceding year. In the *constitutional group* there is an increase of 31·8 per 1,000 in the rate of admission, and the death rate is fractionally higher.

The admissions and deaths from the principal diseases of this class are shown in the following Table :—

Diseases.	Admitted.	Deaths.	Ratio per 1,000 of Strength. 1878. Admitted.	1878. Died.	1869–77. Admitted.	1869–77. Died.
Febrile Group.						
Eruptive Fevers	112	7	3·2	·20	3·9	·16
Continued „	6,844	169	193·6	4·78	164·1	1·93
Yellow Fever	—	—	—	—	—	—
Paroxysmal Fevers	16,260	47	460·0	1·33	417·6	1·34
Cholera	211	148	6·0	4·18	5·9	3·89
Influenza	19	—	·6	—	1·1	—
Erysipelas	57	1	1·6	·03	2·3	·09
Other diseases	5	1	·1	·03	·6	·06
Total	23,508	373	665·1	10·55	595·5	7·47
Constitutional Group.						
Rheumatism	1,418	—	40·1	—	51·8	·02
Syphilis	4,074	2	115·3	·05	86·8	·12
Scrofula, Phthisis, &c.	263	54	7·4	1·53	10·0	1·72
Scurvy and Purpura	3	—	·1	—	·4	·02
Anæmia	82	—	2·3	—	5·1	·05
Other diseases	12	3	·3	·09	·7	·15
Total	5,852	59	165·5	1·67	154·8	2·08

Eruptive Fevers.—The rate of admission is 1·3 per 1,000 of the strength higher than that for 1877. Of the 112 cases 53 were *small-pox*, and the 7 deaths resulted from that disease. *Dengue* gave 30 admissions, and *measles* 22, but no death occurred from either,

Continued Fevers.—The rate of admission is 61·2 per 1,000 men higher than in the preceding year, and the death rate is also higher by 3·17. 409 of the admissions and 167 of the deaths were due to *enteric fever*, while only 1 death resulted from *simple continued fever* and *febricula* combined out of a total of 6,434 cases. *Typhus fever* gave 1 admission with a fatal termination.

Paroxysmal Fevers.—Under this heading there is an immense increase when compared with the preceding year, the rate of admissions being no less than 188 per 1,000 of the strength higher, while the death rate is more than double. *Bengal.*

Cholera appeared in an epidemic form, and the rate of admissions is 5·5, and that of deaths 3·74 per 1,000 men higher than in 1877.

Erysipelas.—The admission rate is higher and the death rate lower than in the preceding year.

Rheumatism was less prevalent than in 1877, and there was no death.

Syphilis.—The rate of admissions is 37·8 per 1,000 men higher than that for last year, 3,312 of the cases came under the heading of *primary*, and 762 of *secondary disease*. The increase is entirely for *primary disease*, the rate for *secondary affections* being a little lower than last year.

Scrofula and Phthisis.—The admission and death rates are nearly identical with those of the preceding year. *Phthisis* contributed the great bulk of the cases.

LOCAL DISEASES.—The admission rates are higher for diseases of the *absorbent, respiratory, digestive, urinary*, and *cutaneous systems* and for those of the *eye*, and *cellular tissue*, but lower for the other groups in this class than last year except the *nose*, which is the same in both years. The death rates are fractionally higher for diseases of the *nervous system*, and there is an increase, of 1·51 per 1,000 for those of the *digestive system*. The rate for diseases of the *circulatory system* is fractionally lower, and those for the other groups show no appreciable alteration.

CONDITIONS, &c.—*Debility.*—The rate of admissions is 5·9 higher than that for last year and 3 deaths occurred; there were no deaths in the previous year.

POISONS.—The rate of admissions is fractionally lower, and that of deaths fractionally higher than in the preceding year.

INJURIES.—*Battle.*—There was only one admission under this head.

Accidents.—The admissions for accidents show a lower rate by 12·8 per 1,000 than in 1877. 1,389 were cases of contusion, 116 of fracture, 580 wounds of various kinds, and 793 were sprains. 8 men were drowned, and 1 died out of hospital from a gunshot wound. In the *suicidal* class 1 died out of hospital from opium poisoning, 1 was drowned, 2 died from hanging, and 2 died in, and 16 out of hospital, from gunshot wounds. *Judicial.*—The 7 admissions were cases of flogging inflicted in gaols.

The following Table, taken from the Reports of the Principal Medical Officer, shows the admissions and deaths which took place at the chief stations in the Command.

Stations.		Average Annual Strength.	Admitted into Hospital.	Died in India.	Ratio per 1,000 of Strength.		Annual Ratio per 1,000 of Strength, 1868–77.	
					Admitted.	Died.	Admitted.	Died.
Presidency	Calcutta	836	833	6	996·4	7·17	1124·9	15·09
	Barrackpore	360	719	4	1997·2	11·11	1915·9	25·74
	Dum-Dum	619	832	3	1344·1	4·84	1114·1	18·45
	Hazaribagh	106	109	—	1029·3	—	1110·2	16·33
	Darjeeling	130	88	3	676·9	23·07	1065·9	8·71
Allahabad	Allahabad	790	1,225	13	1550·6	16·45	1695·9	37·24
	Do. Fort	152	202	8	1328·9	52·63	—	—
	Dinapore	880	1,838	6	1612·0	7·22	1468·0	22·81
	Benares	501	700	8	1397·2	15·96	1527·2	22·23
	Chunar	81	218	4	2691·3	49·38	*2168·4	34·36
	Cawnpore	800	1,017	9	1271·2	11·25	1561·4	23·45

* 8 years only.

Bengal.

Stations.		Average Annual Strength.	Admitted into Hospital.	Died in India.	Ratio per 1,000 of Strength.		Annual Ratio per 1,000 of Strength, 1868–77.	
					Admitted.	Died.	Admitted.	Died.
Oudh	Lucknow	2,330	3,446	50	1478·9	21·45	1293·2	23·65
	Fyzabad	813	1,141	64	1403·4	78·72	1229·7	21·07
	Sitapur	586	583	10	1087·6	1·86	1216·3	16·00
Rohilcund	Bareilly	579	910	29	1571·6	50·08	973·7	10·84
	Shahjahanpur	333	447	5	1342·3	15·01	1028·4	16·72
	Moradabad	177	219	3	1237·2	16·94	924·8	15·75
	Ranikhet	1,253	1088	8	868·3	6·38	*933·9	13·54
Saugor	Saugor	374	533	22	1425·1	58·82	1717·8	26·63
	Jubbulpore	442	694	11	1570·1	24·88	1373·8	23·88
	Nowgong	304	319	9	1049·3	29·60	1696·3	23·45
Gwalior	Morar	1,221	2,026	76	1659·2	62·24	1472·4	23·37
	FortressGwalior	361	393	12	1088·6	33·24	1243·1	23·00
	Jhansi	413	533	1	1290·5	2·42	2502·0	16·70
Meerut	Meerut	1,452	1,791	11	1233·4	7·57	1699·4	26·06
	Fatehgarh	177	230	1	1299·4	5·64	1245·9	15·40
	Agra	1,009	1,663	26	1648·1	25·76	1183·5	15·79
	Muttra	257	322	6	1252·9	23·34	1071·5	16·37
	Delhi	397	1,249	4	3146·0	10·07	1943·2	26·36
	Roorkee	411	511	9	1243·3	21·89	1289·0	18·06
	Chakrata	524	559	5	1066·7	9·54	†731·3	9·21
Sirhind	Umballa	1,230	2,167	25	1761·7	20·32	1421·1	15·55
	Jullundur	714	2,391	32	3348·7	44·81	1512·0	20·15
	Subathu	349	557	12	1595·9	34·38	954·6	14·31
	Dagshai	633	581	14	917·8	22·11	989·2	10·03
	Jutogh	119	153	3	1285·7	25·21	†758·4	15·29
	Solun	164	183	4	1115·8	24·39	‡1060·3	11·76
Lahore	Meen Meer	809	2,821	14	3487·0	17·30	2476·0	34·91
	Fort Lahore	130	360	6	2769·2	46·15	§2179·0	34·21
	Amritsar	182	607	1	3335·1	5·49	§2067·5	30·45
	Fort Govindgarh.	64	169	2	2640·6	31·25	*1841·9	16·13
	Ferozepore	970	2,852	17	2940·2	17·52	1333·8	16·07
	Mooltan	653	1,405	13	2151·6	19·90	1593·7	16·20
	Fort Kangra	56	225	—	4017·8	—	†1438·0	20·25
	Bhagsu	67	71	—	1059·7	—	§1208·6	10·34
	Banikhet	50	72	—	1440·0	20·00	‖1232·2	3·10
Rawal Pindi	Rawal Pindi	1,557	2,511	20	1612·7	12·84	1472·0	13·89
	Campbellpore	114	118	3	1035·0	26·31	1382·7	15·19
	Sialkot	785	1,434	15	1826·7	19·10	1447·7	15·10
	Dera Ismail Khan.	117	318	1	2717·9	85·47	2005·1	17·21
	Fort Attock	319	479	2	1501·5	6·27	2191·8	21·95
	Kooldunnah	111	76	1	684·6	9·00	‖1025·4	7·04
	Khyra Gully	40	44	1	1100·0	25·00	‖1287·4	7·87
	Bara Gully	76	67	—	881·5	—	‖1198·7	12·55
	Chungla Gully	95	63	—	663·1	—	‖1329·9	10·37
	Kalabagh	94	113	1	1202·1	10·63	‖1791·7	7·50
	Camp Ghareeal	131	102	2	778·6	15·26	‡834·8	22·85

* 7 years only.
† 9 years only.
‡ 4 years only.
§ 8 years only.
‖ 5 years only.

Stations.	Average Annual Strength.	Admitted into Hospital.	Died in India.	Ratio per 1,000 of Strength.		Annual Ratio per 1,000 of Strength, 1868–77.	
				Admitted.	Died.	Admitted.	Died.
Peshawar - Peshawar -	1,358	3,146	33	2316·6	24·30	2656·8	34·84
Peshawar - Nowshera -	743	1,084	10	1458·9	13·45	2195·2	16·88
Peshawar - Cherat - -	425	599	4	1409·4	9·41	*1413·2	19·17
Marching - - - -	2,021	2,790	17	1380·5	8·41	918·9	16·42
Field service - - -	31	37	1	1193·5	32·25	†729·7	—
Hill depôts and other hospitals.	2,572	3,009	67	1169·9	26·04	1701·1	33·43

Omitting Kooldunna and Fort Kangra where the strengths were respectively only 111 and 56, the station of Meen Meer as in the preceding year shows the highest rate of admissions into hospital, and exceeds that of last year by no less than 919·7 per 1,000 of the strength. Jullunder gives the next highest rate 3348·7 per 1,000, which is higher than that for 1877 by 2221·4. The rate for Peshawar shows a large increase, being 558·8 higher than last year, and the rate for Calcutta is also higher by 142 per 1,000. Chungla Gully in the Rawal Pindi Division and Dargeeling in the Presidency give the lowest rates of all stations, but the strength is low in each.

* 7 years only. † 1 year only.

Bengal.

The following Table, taken from the Principal Medical Officer's Report, each of the Military Divisions and Districts, with the ratios per 1,000 of

Ordor.	Military Divisions and Districts.	Presidency.		Allahabad.		Oudh.		Rohilcund.		Saugor.	
	Average Annual Strength.	2,051		3,154		3,679		2,342		1,120	
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	I. *General Diseases.*										
1	Febrile Group	1,069	5	1,200	20	1,267	93	588	28	436	23
2	Constitutional Group	244	2	664	—	631	7	490	6	197	—
	II. *Local Diseases.*										
	Diseases of the—										
1	Nervous System	30	1	73	9	84	7	25	2	33	2
2	Eye	26	—	63	—	82	—	49	—	19	—
3	Ear	35	—	45	—	70	—	25	—	3	—
4	Nose	—	—	2	—	4	—	1	—	—	—
5	Circulatory System	24	3	55	1	100	3	26	1	9	4
6	Absorbent „	39	—	103	—	43	—	40	—	30	—
7	Ductless Glands	—	—	—	—	2	—	1	—	—	—
8	Respiratory System	40	—	152	—	196	1	83	3	87	3
9	Digestive „	379	6	867	15	1,067	14	477	5	271	9
10	Urinary „	255	—	648	—	827	—	514	2	234	—
11	Generative „	37	—	64	—	64	—	29	—	29	—
12	Organs of Locomotion	14	—	11	—	9	—	10	—	6	—
13	Cellular Tissue	20	—	46	—	55	—	26	—	11	—
14	Cutaneous System	209	1	258	—	345	—	165	—	104	—
	III. *Conditions, &c.*	56	—	171	—	111	1	55	—	35	—
	IV. *Poisons*	8	—	11	3	16	1	6	1	8	—
	V. *Injuries.*										
1	Battle	—	—	—	—	—	—	—	—	—	—
2	Accidental	171	—	317	2	331	2	192	—	113	2
3	Homicidal	—	—	—	—	—	—	—	—	—	—
4	Self-inflicted	—	3	1	—	2	2	2	1	1	1
5	Judicial	3	—	—	—	—	—	—	—	—	—
	VI. *Surgical Operations*	2	—	5	—	—	—	—	—	—	—
	No appreciable Disease	2	—	8	—	2	—	9	—	2	—
	Not yet diagnosed	—	—	1	—	3	—	5	—	—	—
	Total	2,663	21	4,765	50	5,311	131	2,818	49	1,623	44

shows the prevalence and mortality of the different classes of diseases in Strength :— *Bengal.*

Gwalior.		Meerut.		Sirhind.		Lahore.		Rawal Pindi.		Peshawar.		Camps of Exercise and Troops on March.		Field Service.		Hill Depôts.	
1,995		4,227		3,209		2,981		3,439		2,526		2,021		1,857		1,443	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
1,574	58	2,372	33	2,927	44	5,601	23	2,344	18	2,465	16	432	3	2,580	11	605	4
169	2	734	4	463	7	593	5	687	3	382	2	217	—	259	—	265	5
42	7	69	5	99	8	88	8	64	4	77	7	24	—	19	4	37	2
46	—	69	—	82	—	68	—	72	—	25	—	6	—	13	—	28	—
10	—	43	—	25	—	22	—	20	—	23	1	1	—	5	—	9	—
2	—	1	—	2	—	3	—	—	—	2	—	1	—	1	—	3	—
24	4	46	1	71	4	51	3	76	3	32	1	5	—	11	4	30	1
20	—	73	—	20	—	54	—	60	—	37	—	13	—	28	—	31	—
—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—
61	1	191	1	218	3	328	4	255	4	146	2	34	1	323	14	86	2
447	14	1,118	15	1,160	24	770	10	707	11	444	9	146	—	544	4	483	9
280	1	857	1	494	1	510	—	585	1	204	—	233	—	280	1	169	—
34	—	69	—	63	—	45	—	63	—	26	—	12	—	34	—	22	—
4	—	23	—	10	—	15	—	19	—	12	—	5	—	6	—	2	—
30	—	69	—	78	—	44	—	57	—	24	—	9	—	22	—	33	—
83	—	293	—	336	—	245	—	233	—	106	—	17	—	46	—	40	—
77	1	113	—	90	—	96	1	102	—	82	—	27	—	57	1	77	—
5	1	9	—	12	1	25	1	7	3	4	—	—	—	3	—	1	—
—	—	—	—	—	—	—	—	—	—	1	—	—	—	35	7	—	—
110	1	368	2	323	2	344	2	451	3	182	1	88	—	112	—	108	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1	1	—	5	3	1	3	5	2	1	—	1	1	1	—	—	—	—
—	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—
1	—	1	—	2	—	7	—	5	—	2	—	—	—	3	1	—	—
—	—	4	—	5	—	7	—	5	—	3	—	—	—	2	—	11	—
—	—	3	—	1	—	1	—	5	—	—	—	—	—	—	—	—	—
3,020	91	6,525	67	6,484	95	8,920	62	5,854	51	4,279	40	1,271	5	4,383	47	2,040	23

Bengal.

Ratio per 1,000

Order.	Military Divisions and Districts. / Diseases.	Presidency. Admitted.	Presidency. Died.	Allahabad. Admitted.	Allahabad. Died.	Oudh. Admitted.	Oudh. Died.	Rohilcund. Admitted.	Rohilcund. Died.	Saugor. Admitted.	Saugor. Died.
	I. *General Diseases.*										
1	Febrile Group	521·20	2·43	380·46	6·34	344·38	25·27	251·06	11·35	389·28	29·33
2	Constitutional Group	118·96	0·97	210·52	—	171·51	1·90	209·22	2·56	175·89	—
	II. *Local Diseases.*										
	Diseases of the—										
1	Nervous System	14·63	0·48	23·14	2·85	22·83	1·90	10·67	0·85	29·46	1·78
2	Eye	13·67	—	19·97	—	22·28	—	20·92	—	16·96	—
3	Ear	17·06	—	14·26	—	19·02	—	10·67	—	2·67	—
4	Nose	—	—	0·63	—	1·08	—	0·42	—	—	—
5	Circulatory System	11·70	1·46	17·43	0·31	27·18	0·81	11·10	0·42	8·03	3·57
6	Absorbent „	19·01	—	32·65	—	11·68	—	17·07	—	26·78	—
7	Ductless Glands	—	—	—	—	0·54	—	0·42	—	—	—
8	Respiratory System	19·50	—	48·19	—	53·27	0·27	35·43	1·28	77·67	2·67
9	Digestive „	184·78	2·92	274·88	4·75	290·02	3·80	203·67	2·13	241·96	8·03
10	Urinary „	124·33	—	205·45	—	224·78	—	219·47	0·85	208·92	—
11	Generative „	18·03	—	20·29	—	17·39	—	12·38	—	25·69	—
12	Organs of Locomotion	6·82	—	3·48	—	2·44	—	4·26	—	5·35	—
13	Cellular Tissue	9·75	—	14·58	—	14·94	—	11·10	—	9·82	—
14	Cutaneous System	101·90	0·48	81·80	—	93·77	—	70·45	—	92·85	—
	III. *Conditions, &c.*	27·30	—	54·21	—	30·17	0·27	23·48	—	31·25	—
	IV. *Poisons*	3·90	—	3·48	0·95	4·34	0·27	2·56	0·42	7·14	—
	V. *Injuries.*										
1	Battle	—	—	—	—	—	—	—	—	—	—
2	Accidental	83·37	—	100·50	0·63	89·97	0·54	81·98	—	100·89	1·78
3	Homicidal	—	—	—	—	—	—	—	—	—	—
4	Self-inflicted	—	1·46	0·31	—	0·54	0·54	0·85	0·42	0·89	0·89
5	Judicial	1·46	—	—	—	—	—	—	—	—	—
	VI *Surgical Operations*	0·97	—	1·58	—	—	—	—	—	—	—
	No appreciable Disease	0·97	—	2·53	—	0·54	—	3·84	—	1·78	—
	Not yet diagnosed	—	—	0·31	—	0·81	—	2·13	—	—	—
	Total	1296·39	10·22	1510·77	15·85	1443·59	35·60	1208·34	20·22	1453·57	39·25

of Strength. *Bengal.*

Gwalior.		Meerut.		Sirhind.		Lahore.		Rawal Pindi.		Peshawur.		Camps of Exercise and Troops on March.		Field Service.		Hill Depôts.	
Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
788·97	29·07	561·15	7·80	912·12	13·71	1878·89	7·71	681·59	5·23	975·85	6·33	213·80	1·48	1389·83	5·92	419·26	2·77
84·71	1·00	173·64	0·94	144·28	2·18	198·92	1·67	199·76	0·87	151·22	0·79	107·37	—	139·47	—	183·04	3·46
21·05	3·50	16·32	1·18	30·85	2·49	29·52	2·68	18·61	1·16	30·48	2·77	11·87	—	10·23	2·15	25·64	1·38
23·05	—	16·32	—	25·55	—	22·81	—	20·93	—	9·89	—	2·96	—	7·00	—	19·40	—
5·01	—	10·17	—	7·79	—	7·38	—	5·81	—	9·10	0·39	0·49	—	2·69	—	6·23	—
1·00	—	0·23	—	0·62	—	1·00	—	—	—	0·79	—	0·49	—	0·53	—	2·07	—
12·05	2·00	10·88	0·23	22·12	1·24	17·10	1·00	22·09	0·87	13·66	0·39	2·47	—	5·92	2·15	20·79	0·69
10·02	—	17·26	—	6·23	—	18·11	—	17·44	—	14·64	—	6·43	—	15·07	—	21·46	—
—	—	—	—	—	—	—	—	0·58	—	—	—	—	—	—	—	—	—
30·57	0·50	45·18	0·23	67·98	0·93	110·03	1·84	82·87	1·16	57·79	0·79	16·82	0·49	173·96	7·53	59·59	1·38
224·06	7·01	264·49	3·55	361·48	7·47	258·30	3·55	205·58	3·19	175·77	3·56	72·24	—	292·94	2·15	334·71	6·23
149·33	0·50	202·74	0·23	153·94	0·31	171·08	—	170·10	0·29	80·76	—	115·28	—	150·78	0·53	117·11	—
17·04	—	16·32	—	19·65	—	15·09	—	18·31	—	10·29	—	5·93	—	18·30	—	15·24	—
2·00	—	5·44	—	3·11	—	5·03	—	5·52	—	4·75	—	2·47	—	3·23	—	1·37	—
15·03	—	16·32	—	24·30	—	14·76	—	16·57	—	9·50	—	4·45	—	11·84	—	22·86	—
41·60	—	69·31	—	104·70	—	82·18	—	67·75	—	41·96	—	8·41	—	24·77	—	27·72	—
38·59	0·50	26·73	—	28·04	—	33·20	0·53	29·65	—	32·46	—	13·35	—	30·69	0·53	53·36	—
2·50	0·50	2·12	—	3·73	0·31	3·38	0·33	2·03	0·87	1·58	—	—	—	1·61	—	0·69	—
—	—	—	—	—	—	—	—	—	—	0·39	—	—	—	18·84	3·76	—	—
55·13	0·50	87·05	0·47	100·65	0·62	115·39	0·67	131·14	0·87	72·44	0·39	43·54	—	60·31	—	74·84	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0·50	0·50	—	1·18	0·93	0·31	1·00	1·67	0·58	0·29	—	0·39	0·49	0·49	—	—	—	—
—	—	—	—	—	—	—	—	0·87	—	—	—	—	—	—	—	—	—
0·50	—	0·23	—	0·62	—	2·34	—	1·45	—	0·79	—	—	—	1·61	0·53	—	—
—	—	0·94	—	1·55	—	2·34	—	1·45	—	1·18	—	—	—	1·07	—	7·62	—
—	—	0·70	—	0·31	—	0·33	—	1·45	—	—	—	—	—	—	—	—	—
1513·78	45·61	1548·64	15·85	2020·56	29·60	2092·28	20·79	1702·23	14·82	1603·95	15·88	628·89	2·47	2360·25	25·30	1413·72	15·93

The following Table, taken from the Principal Medical Officer's Report shows the Admissions and Deaths from the principal Diseases in the Febrile and Constitutional Groups, together with the ratios per 1,000 of Strength.

Military Divisions and Districts.	Presidency.		Allahabad.		Oudh.		Rohilcund.		Saugor.		Gwalior.		Meerut.		Sirhind.		Lahore.		Rawal Pindi.		Peshawar.		Camp of Exercise and Troops on March.		Field Service.		Hill Depôts.	
Average Annl Strength	2,051		3,154		3,679		2,342		1,120		1,935		4,227		3,209		2,981		3,439		2,528		2,021		1,857		1,443	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Febrile Group.																												
Eruptive Fevers -	20	—	15	1	28	1	4	1	3	—	10	2	17	1	2	—	8	—	5	1	—	—	—	—	1	—	—	—
Continued „ -	155	1	774	7	611	17	434	26	49	8	565	14	846	23	885	32	694	11	943	13	756	11	106	1	335	3	182	4
Paroxysmal „ -	880	2	388	—	509	2	144	—	361	—	933	3	1,488	2	2,028	12	4,896	12	1,383	4	1,701	5	323	1	2,442	8	421	—
Cholera - - -	2	2	13	12	106	72	1	1	18	14	60	39	10	7	—	—	—	—	—	—	—	—	1	1	—	—	—	—
Influenza - -	1	—	3	—	5	—	2	—	—	—	1	—	2	—	3	—	1	—	—	—	1	—	2	—	1	—	—	—
Erysipelas - -	2	—	7	—	6	1	2	—	4	—	4	—	6	—	9	—	2	—	7	—	7	—	—	—	1	—	2	—
Other Diseases -	—	—	—	—	2	—	1	—	1	1	1	—	3	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
Total - -	1,060	5	1,200	20	1,267	93	588	28	436	23	1,574	58	2,372	33	2,927	44	5,601	23	2,344	18	2,465	16	432	3	2,780	11	605	4
Constitutional Group.																												
Rheumatism - -	58	—	149	—	129	—	76	—	40	—	39	—	163	—	166	—	120	—	204	—	137	—	36	—	69	—	104	—
Syphilis - -	165	1	495	—	459	—	383	—	128	—	117	—	531	1	249	—	423	—	407	—	237	—	175	—	182	—	125	1
Scrofula, Phthisis, &c.	15	1	18	—	34	7	23	6	9	—	12	2	18	3	41	6	25	5	12	2	6	2	5	—	3	—	26	2
Scurvy and Purpura -	—	—	—	—	—	—	—	—	1	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	1	—
Anæmia - -	6	—	1	—	6	—	7	—	19	—	—	—	10	—	4	—	18	—	1	—	—	—	1	—	3	—	8	—
Other Diseases - -	—	—	1	—	3	—	1	—	—	—	1	—	2	—	3	1	1	—	3	1	2	—	—	—	2	—	1	2
Total - -	244	2	664	—	631	7	490	6	197	—	169	2	734	4	463	7	593	5	687	3	382	2	217	—	259	—	265	5

Ratio per 1,000 of Strength.

Military Divisions and Districts.	Presidency.		Allahabad.		Oudh.		Rohilcund.		Saugor.		Gwalior.		Meerut.		Sirhind.		Lahore.		Rawal Pindi.		Peshawar.		Camp of Exercise and Troops on March.		Field Service.		Hill Depôts.	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Febrile Group.																												
Eruptive Fevers	14·13	—	4·75	0·31	7·61	0·27	1·70	0·46	2·67	—	5·01	1·00	4·02	0·23	0·62	—	2·68	—	1·45	0·29	—	—	—	—	0·53	—	—	—
Continued „	75·57	0·48	245·40	2·21	166·07	4·62	184·88	11·10	43·75	7·14	283·20	7·01	200·14	5·44	244·15	9·97	252·80	3·69	274·20	3·78	299·28	4·35	52·44	0·49	180·39	1·61	126·12	2·77
Paroxysmal „	429·06	0·97	123·01	—	138·35	0·54	61·48	—	323·32	—	467·66	1·50	352·02	0·47	631·97	3·74	1642·4	4·02	403·60	1·16	673·39	1·97	159·82	0·49	1315·02	4·30	291·75	—
Cholera	0·97	0·97	4·12	3·80	28·81	19·57	0·46	0·46	16·07	12·50	30·07	19·54	2·36	1·65	—	—	—	—	—	—	—	—	0·49	0·49	—	—	—	—
Influenza	0·48	—	0·95	—	1·35	—	0·85	—	—	—	0·50	—	0·47	—	0·93	—	0·33	—	—	—	0·39	—	0·98	—	0·53	—	—	—
Erysipelas	0·97	—	2·21	—	1·63	0·27	0·85	—	3·57	—	2·00	—	1·41	—	2·80	—	0·67	—	2·03	·27	2·77	—	—	—	0·53	—	1·38	—
Other Diseases	—	—	—	—	0·54	—	0·46	—	0·89	0·59	0·50	—	0·70	—	—	—	—	—	0·29	—	—	—	—	—	—	—	—	—
Total	521·20	2·43	380·46	6·34	344·38	25·27	251·06	11·95	389·28	20·53	788·97	29·07	561·15	7·80	912·12	13·71	1878·89	7·71	681·59	5·23	975·85	6·33	213·80	1·48	1389·33	5·92	419·26	2·77
Constitutional Group.																												
Rheumatism	28·27	—	47·20	—	35·06	—	32·45	—	35·71	—	19·54	—	38·56	—	51·72	—	40·25	—	59·31	—	54·23	—	17·81	—	37·15	—	72·07	—
Syphilis	80·44	0·48	156·94	—	124·76	—	163·53	—	114·28	—	58·64	—	125·62	0·23	77·59	—	143·57	—	135·79	—	93·82	—	86·59	—	98·00	—	86·62	0·69
Scrofula Phthisis, &c.	7·31	0·48	5·70	—	9·24	1·90	9·82	2·56	8·03	—	6·01	1·00	4·25	0·70	12·77	1·86	8·38	1·67	3·48	0·58	2·37	0·79	2·47	—	1·61	—	18·01	1·38
Scurvy and Purpura.	—	—	—	—	—	—	—	—	0·89	—	—	—	0·23	—	—	—	0·33	—	—	—	—	—	—	—	—	—	0·69	—
Anæmia	2·92	—	0·31	—	1·63	—	2·98	—	16·96	—	—	—	4·49	—	1·24	—	6·03	—	0·29	—	—	—	0·49	—	1·61	—	5·54	—
Other Diseases	—	—	0·31	—	0·81	—	0·46	—	—	—	0·50	—	0·47	—	0·93	0·31	0.33	—	0·87	0·29	0·79	—	—	—	1·07	—	0·69	1·38
Total	118·96	0·97	210·52	—	171·51	1·90	209·22	2·56	175·89	—	84·71	1·00	173·64	0·94	144·28	2·18	198·92	1·67	199·76	0·87	151·22	0·79	107·37	—	139·47	—	183·64	3·46

Bengal.

General Diseases.—Compared with 1877 there is an increase in the rate of admissions for all divisions except the Saugor and the depôts, the increase is very large in many of the divisions, and varies from 1,081 for Lahore to 56 for the Presidency division. For diseases of the *febrile group* the rate is higher for all divisions except Saugor and the depôts; the increase amounts to 58 per 1,000 men for the Presidency, to 49 for the Allahabad, to 48 for the Oudh, to 148 for the Rohilcund, to 530 for the Gwalior, to 308 for the Meerut, to 617 for the Sirhind, to 797 for the Lahore, to 182 for the Rawal Pindi, and to 161 for the Peshawar division. The decrease for Saugor is only 1 per 1,000 and that for the depôts amounts to 168. For diseases of the *constitutional group* the rate of admissions is higher than in the preceding year for Allahabad, Oudh, Meerut, Sirhind, Lahore, Rawal Pindi, and Peshawar, but lower for the remaining divisions; the greatest increase is that for the Lahore division, 97 per 1,000 men, the smallest increase is 20 per 1,000 for the Allahabad. The largest decrease is 39 per 1,000 for Gwalior, the smallest is for the Presidency and Rohilcund divisions, which are each 1 per 1,000 lower than last year. For the depôts the rate is 22 per 1,000 higher than in 1877. The rate of deaths for diseases of the *febrile group* is higher than in the preceding year for all divisions, and many show an immense increase which is due to an unusual prevalence of *continued* and *paroxysmal fevers* and to *cholera*. In the Presidency division the rate is higher by 1·44, for the Allahabad by 2·56, for the Oudh by 23·15, for the Rohilcund by 10·37, for the Saugor by 17·05, for the Gwalior by 24·65, for the Meerut by 4·58, for the Sirhind by 10·66, for the Lahore by 4·97, for the Rawal Pindi by 1·48, and for the Peshawar by 5·13 per 1,000 of the strength. The rate for the convalescent depôts is also higher by ·85 per 1,000. The rate of deaths for diseases of the *constituional group* is higher than in the preceding year for the Oudh division by 1·11 per 1,000 men, for the Rohilcund by 2·16, for the Gwalior by ·45, for the Sirhind by 1·42, for the Rawal Pindi by ·60, for the Peshawar by ·79, and for the convalescent depôts by ·90. The rates are lower for the Presidency division by ·51, for the Saugor by ·87, for the Meerut by ·21, for the Lahore by 1·38.

Eruptive Fevers.—There is no marked difference in the rates of admission for these fevers when compared with 1877 in any of the divisions, except in the Presidency where the rate is 11·63 per 1,000 men higher, which is due to an outbreak of *dengue* at Calcutta in the 54th Regiment and in the B. Battery 3rd Brigade Royal Artillery at Barrackpore, in the months of August and September. Cases of *small-pox* occurred in all the divisions, the highest number of admissions taking place at Lucknow (8), Cawnpore (7), Morar (6), Allahabad (5), Rawal Pindi (4), Meerut (4); a few admissions took place in nearly every month in the year.

Continued Fevers.—Compared with 1877 the rate of admissions is higher in every division except the Presidency, Saugor, and Pashawar, and is also higher for the Hill Depôts. For the Allahabad division there is an increase of 109 per 1,000 men, for the Oudh of 51, for the Rohilcund of 130, for the Gwalior of 212, for the Meerut of 99, for the Sirhind of 36, for the Lahore of 65, for the Rawal Pindi of 165, and for the Hill Depôts of 29; the rate is lower for the Presidency division by 129, for the Saugor by 37, and for the Peshawar by 67 per 1,000. The rate of mortality for fevers of the continued group, is also much higher than in 1877 for nearly all the divisions, and is only lower in the Presidency, where it is but fractionally so; it is higher for the Allahabad division by ·63 per 1,000 men, for the Oudh by 3·57, for the Rohilcund by 9·52, for the Saugor by 4·53, for the Gwalior by 4·80, for the Meerut by 2·68, for the Sirhind by 7·42, for the Lahore by 1·56, for the Rawal Pindi by 3·24, for the Peshawar by 3·15, and for the Hill Depôts by ·85.

Enteric Fever.—This disease was very prevalent, the rates of admissions and deaths being as nearly as possible three times as great as in the preceding year, and the proportion of deaths to the number of cases treated is also higher by 37·6 per 1,000 men. Cases occurred in every division, and, indeed, at nearly every station, but it was most rife at Lucknow, Bareilly, Agra, Umballa, Morar, Meerut, and Subatha, and took place chiefly in the second and third quarters of the year, which contributed more than three-fourths of the total number of cases. It would thus appear that the hot and monsoon months were the special seasons for its prevalence, and the influence of "youth" and "recent arrival in the country" were as usual the most remarkable factors in conducing

to susceptibility to the disease. Out of the 166 deaths nearly one-half occurred among men in their first year of Indian service, and 26 were among men in their second year, or a total of 106 out of 166 deaths occurred among men who were less than two years in the country, and 97 were men of 24 years of age and under, and 58 were between the ages of 25 and 29. *Bengal.*

The stations at which the admissions and the deaths from *enteric fever* took place are shown in the following Table, the data being taken from the Monthly Returns of the Command :—

Divisions.	Stations.	1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total.	
		Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
Presidency	Barrackpore	—	—	—	—	—	—	1	1	1	1
Allahabad	Allahabad	1	—	3	2	1	—	—	—	5	2
	Dinapore	—	—	2	1	1	1	—	—	3	2
	Benares	—	—	—	—	1	1	—	—	1	1
	Cawnpore	—	—	1	1	1	1	—	—	2	2
Oudh	Lucknow	3	2	24	7	9	2	5	3	41	14
	Fyzabad	—	—	1	—	—	—	1	—	2	—
	Sitapur	—	—	—	—	3	3	—	—	3	3
Rohilcund	Bareilly	—	—	33	17	6	2	3	3	42	22
	Shahjehampur	—	—	1	—	—	—	1	—	2	—
	Moradabad	—	—	1	—	—	—	—	—	1	—
	Ranikhet	—	—	7	3	1	—	—	—	8	3
	Choubuttra	—	—	1	—	—	—	—	—	1	—
	Cholera Camp	—	—	—	—	1	—	—	—	1	—
Sangor	Jubbulpore	4	3	—	—	1	—	1	—	6	3
	Saugor	—	—	—	—	2	1	5	3	7	4
	Camp Patharia	—	—	—	—	—	—	1	1	1	1
Gwalior	Morar	2	2	1	—	16	7	6	4	25	13
	Cholera Camp	—	—	—	—	—	1	2	—	2	1
Meerut	Meerut	5	1	14	2	2	1	—	—	21	4
	Agra	2	—	5	—	20	4	14	8	41	12
	Delhi	—	—	2	1	—	—	1	1	3	2
	Roorkee	1	—	14	5	—	—	—	—	15	5
	Chakrata	—	—	—	—	—	—	1	—	1	—
Sirhind	Umballa	5	1	12	7	10	4	4	1	31	13
	Jullundur	—	—	1	1	—	—	3	2	4	3
	Subathu	1	1	7	1	8	2	4	3	20	7
	Dagshai	1	1	—	—	14	5	3	2	18	8
Lahore	Meen Meer	—	—	3	3	—	—	1	1	4	4
	Lahore	—	—	4	1	1	1	—	—	5	2
	Ferozepore	1	—	—	—	3	1	2	1	6	2
	Mooltan	—	—	—	—	6	3	—	—	6	3
Rawal Pindi	Rawal Pindi	1	—	9	2	—	—	3	1	13	3
	Sialkot	1	—	3	1	4	4	1	—	9	5
	Campbellpore	1	1	1	1	—	—	—	—	2	2
	Khrya Gally	—	—	1	1	—	—	—	—	1	1
	Camp Thoba	—	—	1	—	—	—	—	—	1	—
Peshawar	Peshawar	2	1	10	6	5	2	—	—	17	9
	Nowshera	—	—	2	1	—	—	—	—	2	1
	Cherat	—	—	11	1	—	—	—	—	11	1
Depôts	Landour	—	—	—	—	1	—	—	—	1	—
	Naini Tal	—	—	2	1	—	—	—	—	2	1
	Kasauli	—	—	7	1	4	2	—	—	11	3
	Murree	—	—	1	—	3	1	—	—	4	1
	Pachmathi	—	—	—	—	—	—	1	1	1	1
	Troops marching	—	—	—	—	—	—	—	1	—	1
	Total in the Command	31	13	185	67	124	49	64	37	404	166

Bengal.

Simple Continued Fever and Febricula.—For all the divisions there was a great increase in the rate of admissions for these forms of fever, but only 1 death resulted, which was returned under the head of *simple continued fever.*

Paroxysmal Fevers.—The rate of admissions for these fevers is higher for all divisions than in the preceding year, except for Allahabad and Oudh, and the increase is in most instances very large; for the Presidency division it is higher by 175 per 1,000 men, for the Rohilcund by 15, for the Saugor by 17, for the Gwalior by 286, for the Meerut by 208, for the Sirhind by 552, for the Lahore by 734, for the Rawal Pindi by 17, and for the Peshawar by 226: the rates are lower for the Allahabad division by 65 per 1,000 men, for the Oudh by 33, and for the Hill Depôts by 194. The death rates for these fevers are higher than in the preceding year for the Presidency, the Oudh, the Gwalior, the Meerut, the Sirhind, the Lahore, and the Peshawar divisions, but lower for all others; the highest increase, 3·49, is observed in the Sirhind division; the lowest rates are given for Allahabad, Rohilcund, Saugor, and the Depôts where there was no mortality. Thirty-two of the fatal cases are returned under the head of *remittent fever*, and 15 as *ague.*

Cholera appeared in an epidemic form and was prevalent in the month of May at Morar and Gwalior, and in August and September at many stations, but particularly so at Fyzabad in the 2nd Battalion of the 25th Regiment.

The stations at which the admissions and the deaths from cholera took place are shown in the following Table, the data being taken from the Monthly Returns of the Command:—

Divisions and Stations.	1st Quarter.		2nd Quarter.		3rd Quarter.		4th Quarter.		Total.	
	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.
Presidency - Calcutta	2	2	—	—	—	—	—	—	2	2
Allahabad - Allahabad	1	—	—	—	8	8	—	—	9	8
Allahabad - Dinapore	—	—	—	—	1	1	—	—	1	1
Allahabad - Benares	—	—	—	—	1	1	—	—	1	1
Allahabad - Chunar	—	—	—	—	2	2	—	—	2	2
Oudh - Lucknow	—	—	—	—	14	9	6	5	20	14
Oudh - Fyzabad	—	—	—	—	66	43	—	—	66	43
Oudh - Cholera Camp	—	—	—	—	19	15	—	—	19	15
Rohilcund - Shahjehampur	—	—	—	—	1	1	—	—	1	1
Rohilcund - Cholera Camp	—	—	—	—	7	5	—	—	7	5
Saugor - Saugor	—	—	—	—	6	4	1	1	7	5
Saugor - Nowgong	—	—	—	—	4	4	—	—	4	4
Gwalior - Morar	—	—	28	21	7	6	1	—	36	27
Gwalior - Fort Gwalior	—	—	1	—	8	6	—	—	9	6
Gwalior - Cholera Camp	—	—	14	6	—	—	—	—	14	6
Meerut - Agra	—	—	2	1	8	6	—	—	10	7
Troops marching	—	—	—	—	—	—	1	1	1	1
Total in the Command	3	2	45	28	152	111	9	7	209	148

Rheumatism.—The rate of admissions for all stations together is 5·8 per 1,000 men lower than that for the preceding year, the rates for the Allahabad,

Sirhind, Lahore, and Pashawar divisions, and the depôts show an increase; but all others are lower. *Bengal.*

Syphilis.—Compared with 1877 the rate of admissions is higher for the Presidency division by 7 per 1,000 men; for Allahabad by 18, for the Oudh by 47, for the Rohilcund by 6, for the Meerut by 47, for the Sirhind by 23, for the Lahore by 96, for the Rawal Pindi by 80, and for the Peshawar by 54. It is lower for the Saugor division by 27 per 1,000 men, for the Gwalior by 12, and for the Hill Depôts by 19.

Scrofula, Phthisis, &c.—The rate of admissions for all divisions together is fractionally lower than that for last year, it is lower for the Presidency division by ·6 per 1,000 men, for the Allahabad by ·3, for the Gwalior by 1·19, for the Meerut by 2·45, for the Lahore by 3·82, for the Rawal Pindi by 4·32, and for the Hill Depôts by 14·59, but is higher for the Oudh division by 1·54, for the Rohilcund by 4·32, for the Peshawar by ·37, for the Saugor by 1·93, and for the Sirhind by 4·87.

Anæmia.—The rate of admissions for all divisions together is 2·3 per 1,000 men, which is identical with that of last year, The Allahabad, Rohilcund, Gwalior, Sirhind, Rawal Pindi, and Peshawar divisions, and the Hill Depôts give lower rates than those for 1877, but all others are higher; the highest rate is that for Saugor which is 16·96, or an increase of 12·56 on last year. There were no admissions in the Gwailior or Peshawar divisions.

Local Diseases.—*Diseases of the Nervous System.*—The rate of admissions for diseases in this order is for all divisions together, fractionally lower than that for the preceding year; the rates are higher for the Rohilcund, Saugor, Sirhind, Lahore, and Peshawar divisions, but lower for all others and the depôts. The aggregate death rate for all divisions together is higher, but fractionally, than that for last year, and the rates for the various divisions do not differ very materially for the two years. There were 138 cases of sunstroke with 44 deaths, tetanus gave 2 admissions and 2 deaths, and epilepsy 103 admissions, but no death.

Diseases of the Eye.—The rate of admissions for all divisions together is 2·8 per 1,000 men higher than that for last year. The rates for the various divisions do not show any marked difference in the two years except for Gwalior, which is 13·65 per 1,000 men higher.

Diseases of the Circulatory System.—The rate of admissions for all divisions together is 5·4 per 1,000 men lower than that for the preceding year. The rate is lower for the Presidency division by 13·00 per 1,000 men, for the Oudh by 3·32, for the Rohilcund by 8·30, for the Gwalior by 7·27, for the Meerut by 6·12, for the Sirhind by 8·18, for the Lahore by 1·40, for the Rawal Pindi by 17·61, and for the Hill Depôts by 3·61, but higher for the Allahabad division by 3·93, for the Saugor by 1·03, and for the Peshawar by 3·06. There were no less than 395 admissions for palpitation, and as in the previous year, the rise or fall in the rates for the various divisions is almost entirely dependent on the number of cases returned under that head. Valvular disease of the heart and fatty degeneration were the chief causes of mortality.

Diseases of the Respiratory System.—The rate of prevalence of diseases of this order is higher than in the preceding year for the Allahabad, Oudh, Rohilcund, Saugor, Sirhind, Lahore, and Peshawar divisions, but lower for all others and the Hill Depôts, the excess is greatest in the Lahore division where it amounts to 32·73 per 1,000, and the decrease is greatest in the Rawal Pindi and Presidency divisions where it is nearly 20 per 1,000 lower in each.

Diseases of the Digestive System.—The rate of admissions for all divisions together is 35·1 per 1,000 men higher than last year; it is higher for the Presidency division by 2 per 1,000 men, for the Allahabad by 51, for the Oudh by 46, for the Rohilcund by 66, for the Saugor by 71, for the Gwalior by 8, for the Meerut by 62, for the Sirhind by 94, for the Lahore by 65, for the Rawal Pindi by 3, for the Peshawar by 7, and for the Depôts by 7. The rate of deaths is higher for the Presidency division by 1·44 per 1,000 men, for the Allahabad by ·03, for the Oudh by 1·68, for the Saugor by 5·41, for the Gwalior by 4·24, for the Meerut by ·11, for the Sirhind by 6·45, for the Lahore by 1·21, for the Rawal Pindi by ·78, and the Peshawar by 1·55; it is lower for Rohilcund by ·64, and for the Depôts by ·19.

Bengal.

The prevalence of dysentery, diarrhœa, and hepatitis, in each of the divisions, and the deaths due to them, are shown in the first of the following tables; in the second, the relation of prevalence and mortality of these diseases to seasons is shown:—

Ratio per 1,000 of Strength.

Divisions.	Presidency.		Allahabad.		Oudh.		Rohilcund.		Saugor.		Gwalior.		Meerut.	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Dysentery - -	27·8	·98	32·0	·95	46·2	1·38	40·6	—	29·5	·89	38·1	2·50	33·3	—
Diarrhœa - -	34·6	—	75·2	—	95·7	·27	58·9	—	41·0	—	67·7	1·50	72·4	—
Hepatitis and abcess of the liver.	21·9	1·45	45·3	2·85	49·7	1·63	22·2	1·28	51·8	6·25	36·5	2·50	57·5	2·13
	84·3	2·43	152·5	3·80	191·6	3·28	121·7	1·28	122·3	7·14	142·3	6·50	163·2	2·13

(*continued.*)

Divisions.	Sirhind.		Lahore.		Rawal Pindi.		Peshawar.		Depôts.		Troops on the March, and Camps of Exercise.	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Dysentery - -	67·3	2·80	44·6	1·34	27·9	1·16	15·8	·39	21·8	·38	23·8	—
Diarrhœa - -	92·2	—	65·7	—	42·2	·29	56·6	—	34·2	—	24·2	—
Hepatitis and abscess of the liver.	58·9	3·43	29·9	1·34	35·2	1·16	18·2	2·37	65·3	3·11	8·4	—
	218·4	6·23	140·2	2·68	105·3	2·61	90·6	2·76	121·3	3·49	55·4	—

—	Hepatitis (including Abscess of the Liver).				Dysentery.				Diarrhœa.				Total.			
	Number.		Ratio per 1,000 of the Strength.		Number.		Ratio per 1,000 of the Strength.		Number.		Ratio per 1,000 of the Strength.		Number.		Ratio per 1,000 of the Strength.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
1st quarter	221	9	6·2	·25	148	—	4·2	—	362	1	10·2	·03	731	10	20·7	·28
2nd „	387	13	10·9	·37	325	1	9·2	·03	670	—	19·0	—	1,382	14	39·1	·40
3rd „	489	25	13·8	·71	337	7	9·5	·20	729	2	20·6	·05	1,555	34	43·9	·96
4th „	330	28	9·3	·79	450	27	12·7	·76	441	2	12·5	·06	1,221	57	34·5	1·61

Diseases of the Urinary System.—The total number of admissions for diseases of this order for all divisions together amounted to 6,012 against 4,480 last year, and shows a higher rate by 47·9 per 1,000 men, gonorrhœa, as in other years, causing the great bulk of the cases. The rates are higher than in the preceding year for the Allahabad division by 34 per 1,000 men, for the Oudh by 78, for the Rohilcund by 101, for the Saugor by 74, for the Gwalior by 33, for the Meerut by 94, for the Sirhind by 49, for the Lahore by 62, and for the Rawal Pindi by 50, but lower for the Presidency division by 14, for the Peshawar by 21, and for the depôts by 4. *Bengal.*

Diseases of the Cutaneous System.—The rate of admissions for the whole Command is higher by 4·8 per 1,000 men than that for the preceding year; higher rates are given for the Presidency, Rohilcund, Meerut, Sirhind, Lahore, Rawal Pindi, and Peshawar divisions, but lower for all others and the depôts.

CONDITIONS.—*Debility.*—The rate of admissions for all divisions together is higher by 5·9 per 1,000 men than in the preceding year. The Presidency, Oudh, Lahore, and Rawal Pindi show lower rates, but higher are given for all other divisions and the depôts.

POISONS.—Compared with the preceding year the rate of admissions is higher for the Gwalior, Meerut, Sirhind, and Lahore divisions, but lower for all others and the depôts.

Officers.

In a mean annual strength of 1,295 commissioned officers there were 993 cases of illness, and 25 deaths, being respectively in the rates of 766·80, and 19·30 per 1,000 of the strength, or a rate of 114 higher for admissions, and 1·69 lower for the deaths than that for the preceding year. Continued and paroxysmal fevers, rheumatism, dyspepsia, and bowel complaints caused the great bulk of the admissions. The deaths were due chiefly to enteric and remittent fever, cholera, abscess of the liver, and sunstroke.

Women.

The average annual strength of the wives of non-commissioned officers and men was 2,868. There were 3,818 admissions into hospital (including 723 cases of child-birth), and 87 deaths. The admission rate is 1,330 per 1,000 of the strength, or 268 per 1,000 higher than that for the preceding year, and the death rate is 30·33 or 12·89 higher. Continued and paroxysmal fevers, bowel complaints, hepatitis, dyspepsia, conjunctivitis, and general debility, were the principal causes of admissions. The deaths were due chiefly to continued and paroxysmal fevers, cholera, phthisis pulmonalis, hepatitis, abscess of the liver, dysentery, diarrhœa, and sunstroke.

Children.

The average annual strength of soldiers children was 6,095. There were 4,908 admission into hospital, and 430 deaths, being in the rates respectively of 805, and 70·54 per 1,000 of the strength. The rate of admissions is 267, and the death rate 28·2 per 1,000 higher than in the preceding year. The principal diseases causing sickness among them were continued and paroxsymal fevers, conjunctivitis, diarrhœa, dysentery, bronchitis, teething, and general debility. The chief causes of mortality were diarrhœa (70), (teething (56), general debility (48), fevers, (30), tabes mesenterica (24), cholera (20), dysentery (20), &c., &c.

Madras.

II.—MADRAS.

STATISTICAL REPORT.

The average annual strength of the troops in the Command was 10,880 non-commissioned officers and men; there were 14,537 admissions into hospital; the deaths (including those of 20 invalids who died on the voyage home or after their arrival in England) were 253 in number; and the average daily sick was 678·42. The rates represented by these numbers are for the admissions 1336·1, for the deaths 23·25, and for the constantly sick 62·35 per 1,000 of the average annual strength. The admission rate is 193·1, that of the deaths 4·73, and that of the constantly sick 8·52 per 1,000 men higher than in 1877.

The admissions and deaths in the different classes and orders of diseases are shown in the following Table:—

Orders.	Diseases.	Strength 10,880.				Ratio per 1,000 of Mean Strength.			
			Deaths.			1878.		1869–77.	
		Admitted.	In Command.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	I. *General Diseases.*								
1	Febrile Group	3,812	60	—	60	350·4	5·52	229·5	3·73
2	Constitutional Group	1,827	12	10	22	167·9	2·02	156·6	2·04
	II. *Local Diseases.*								
	Diseases of the—								
1	Nervous System	181	36	2	38	16·6	3·49	19·4	1·99
2	Eye	166	—	—	—	15·3	—	19·4	—
3	Ear	85	—	—	—	7·8	—	9·1	—
4	Nose	4	1	—	1	·4	·09	·4	—
5	Circulatory System	174	13	2	15	16·0	1·38	18·4	1·86
6	Absorbent „	317	—	—	—	29·1	—	26·2	—
7	Ductless Glands	1	1	—	1	·1	·09	—	—
8	Respiratory System	451	7	—	7	41·4	·65	42·8	·51
9	Digestive „	3,593	75	6	81	330·2	7·45	335·0	6·74
10	Urinary „	1,237	—	—	—	113·7	—	84·4	·16
11	Generative „	173	—	—	—	15·9	—	15·3	—
12	Organs of Locomotion	45	1	—	1	4·1	·09	4·6	·03
13	Cellular Tissue	200	2	—	2	18·4	·18	16·9	·02
14	Cutaneous System	783	—	—	—	72·0	—	78·6	—
	III. *Conditions, &c.*								
	Debility	352	2	—	2	32·3	·18	35·3	·06
	IV. *Poisons.*	64	6	—	6	5·9	·55	8·2	·45
	V. *Injuries.*								
1	Battle	—	—	—	—	—	—	—	—
2	Accidental	1,048	10	—	10	96·3	·92	100·0	1·19
3	Homicidal	—	—	—	—	—	—	·1	·04
4	Self-inflicted	2	6	—	6	·2	·55	·2	·53
5	Judicial	—	—	—	—	—	—	—	·03
	VI. *Surgical Operations*	5	—	—	—	·5	—	·4	—
	No appreciable Disease	17	—	—	—	1·6	—	1·1	—
	Cause unknown	—	1	—	1	—	·09	—	·03
	Total	14,537	238	20	253	1336·1	23·25	1201·9	19·40
	Average of 10 years, 1868–77	—	—	—	—	1220·2	19·80	—	—

GENERAL DISEASES.—The admission rate for this class exceeds that of the preceding year by 146·9, and the death rate is also higher by 1·09 per 1,000 of the strength. The *Febrile Group* shows an increase both in admissions and deaths. In the former by 138·5; in the latter by 1·52 per 1,000 men. The *Constitutional Group* shows an increase in the admission rate of 8·6, and a decrease in the death rate of ·43 per 1,000 of the strength. *Madras.*

The following Table shows the prevalence and mortality of the principal diseases included in this class :—

General Diseases.	Admitted.	Died.	Ratio per 1,000 of Mean Strength. 1878. Admitted.	1878. Died.	1869–77. Admitted.	1869–77. Died.
Febrile Group—						
Eruptive Fevers	25	4	2·3	·37	1·2	·08
Continued „	1,942	19	178·6	1·75	122·7	1·60
Yellow Fever	—	—	—	—	—	—
Paroxysmal Fevers	1,767	8	162·4	·74	99·1	·35
Cholera	43	28	3·9	2·57	3·0	1·58
Influenza	18	—	1·7	—	1·4	—
Erysipelas	9	—	·8	—	1·6	·05
Other Diseases	8	1	·7	·09	·5	·07
Total	3,812	60	350·4	5·52	229·5	3·73
Constitutional Group.						
Rheumatism	361	—	33·2	—	38·2	·02
Syphilis	1,361	—	125·1	—	101·0	·19
Scrofula, Phthisis, &c.	67	21	6·2	1·93	11·9	1·63
Scurvy and Purpura	—	—	—	—	·4	·02
Anæmia	32	—	2·9	—	4·2	—
Other Diseases	6	1	·5	·09	·9	·18
Total	1,827	22	167·9	2·02	156·6	2·04

Eruptive Fevers.—Of the 25 admissions 10 were for small-pox, 14 for measles, and one for cow-pox. All the deaths were from small-pox, the rate of admissions for which was more than double that for 1877.

Continued Fevers.—*Simple continued fever* and *febricula* were much more prevalent than in the preceding year, the admission rates being 42 per 1,000 men higher The deaths, 12 in number, were due to simple continued fever, the rate of mortality being in the proportion of more than 12 to 1 higher than in 1877. *Enteric Fever* contributed only 7 admissions, and there were 5 deaths against 65 admissions and 22 deaths in 1877, or admission and death rates of ·64 and ·46 per 1,000 respectively against 5·90 and 2 in the preceding year. This is a very striking diminution in the rate of admissions and mortality from this form of fever when compared with previous years, while there is a remarkable increase in the rates for simple continued and remittent fevers, and it is worthy of remark that the aggregate death rate from all these fevers differs only by 3 per 1,000 from that of 1877. The Principal Medical Officer observes, "A good deal of this decrease is probably due simply to a change in nomen- "clature, diseases returned as enteric fever in 1877 being classed under the "heads of simple continued and remittent fevers in the present year."

Paroxysmal Fevers.—Ague and remittent fever show a higher rate of admissions than in the preceding year by 92·1 per 1,000 of the strength. Eight

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deaths occurred, the rate of mortality being more than sevenfold higher than in 1877.

Cholera.—There were 43 admissions and 28 deaths from this disease, giving ratios, respectively, fractionally only, higher than in the preceding year. Cases occurred in all the Circles, but the disease was most prevalent in Hyderabad and Burmah.

Rheumatism.—The rate of admissions is 4·2 per 1,000 of the strength higher than in 1877.

Syphilis.—The rate of admissions is 5·7 per 1,000 of the strength higher than in 1877. There were 1,150 admissions for primary and 211 for secondary affections. The Principal Medical Officer writes: "The results attending the "prevalence of venereal diseases during the past year have been unsatisfactory. "During 1877 the pressure of famine led many of the starving population to "practice prostitution as a means of livelihood, and during 1878, this cause, "although existing in a less degree than in the former year, was still pre- "sent, and the statistics of these affections show that their prevalence had "increased."

Scrofula and Phthisis.—The rate of admissions is 2·5 per 1,000 of the strength lower than in 1877, and the death rate is also lower fractionally. There were 60 cases of Phthisis Pulmonalis and 7 of Tubercular Hæmoptysis. Eleven of the deaths in the Command were due to the former and one to the latter affection.

Anæmia.—The admission rate is more than double that of the preceding year.

Local Diseases.—*Diseases of the Nervous System.*—The admission and death rates are both a little higher than in 1877. Sunstroke caused 23 deaths against 13 in the preceding year.

Diseases of the Eye.—The rate of admissions for these affections is much lower than in 1877.

Diseases of the Circulatory System.—The admission and death rates are nearly identical with those of the preceding year. The chief cause of admissions was Palpitation, which contributed 106 of the cases. Valvular disease of the heart and pericarditis were the principal causes of mortality.

Diseases of the Respiratory System.—The rate of admission exceeds that of 1877 by 1·7 per 1,000 of the strength, and the death rate is also higher fractionally. The chief causes of the admissions were bronchitis and bronchial catarrh. More than half of the deaths were from pneumonia.

Diseases of the Digestive System.—The rate of admissions exceeds that of the preceding year by 15·7 per 1,000 men, and the death rate is also higher by 1·82. The chief causes of admissions were dysentery, diarrhœa, dyspepsia, and hepatitis, and of 75 deaths recorded in the Command 40 were due to hepatitis and abscess of the liver, and 28 to dysentery.

Diseases of the Urinary System.—The admission rate is in excess of that of 1877 by 6·3 per 1,000 men. Of the 1,237 admissions, 1,008 were due to gonorrhœa, and 38 to stricture of the urethra.

Diseases of the Cellular Tissue.—The rate of admissions is a little higher than that of the preceding year. The two deaths were due to abscess.

Diseases of the Cutaneous System.—The rate of admissions exceeds that of 1877 by 16·5 per 1,000 men. Ulcers and boils were the most prevalent affections. Two cases of guinea worm are recorded, both having occurred at Fort George, in the 43rd Regiment.

Conditions.—There were 352 admissions for Debility, or a ratio of 32·35 per 1,000 men, exceeding that of the preceding year by 3·8.

Poisons.—Sixty-four admissions are recorded under this head, of which 43 were for delirium tremens, 20 for alcoholic poisoning, and 1 for snake bite. Of the 6 deaths 4 were returned under the head of delirium tremens and 2 as alcoholic poisoning.

Injuries.—*Accidental.*—The rate of admissions is 10·9 per 1,000 men higher than that of 1877. Of the 10 deaths, 4 were due to drowning, 4 to fractures and 2 to lightning stroke.

Self-inflicted.—There were 6 cases of suicide, 3 by drowning, and 3 from gunshot wounds, besides which there was 1 admission for cut throat and 1 for gunshot wound of face both of which recovered.

Surgical Operations.—Five cases are shown under this head all of a trivial nature.

Admissions and deaths at each of the principal stations in the Command are shown in the following Table, which is taken from the report of the Principal Medical Officer :— *Madras.*

Stations.	Average Strength.	Average Daily Sick.	Admitted.	Died in and out of Hospital.	Invalided.	Ratio per 1,000 of Strength.				Average of previous Period of 10 Years.	
						Average Daily Sick.	Admitted.	Died (in and out).	Invalided.	Admitted.	Died.
PRESIDENCY:											
Fort St. George -	590	55	819	10	41	93·22	1388·14	16·95	69·49	1290·23	19·02
Palaveram - -	26	—	9	1	—	—	346·15	38·46	—	438·93	9·93
St. Thomas's Mt. -	313	24	371	5	7	76·68	1185·30	15·97	22·36	1298·68	22·58
Trichinopoly -	269	18	365	14	6	66·91	1356·88	52·04	22·30	1340·95	19·29
Bellary - -	869	77	1,607	11	30	88·61	1849·25	12·66	34·53	1143·69	9·24
Total -	2,067	174	3,171	41	84	84·18	1534·11	19·84	40·63	—	—
MYSORE:											
Bangalore - -	1,610	105	1,898	18	93	65·22	1178·88	11·18	57·76	1201·69	12·41
Cannanore - -	640	34	824	13	42	53·12	1287·50	20·31	65·62	1159·11	16·14
Calicut - -	98	6	128	3	10	61·22	1306·12	30·61	102·04	1027·53	16·65
Malliaporam -	95	2	30	2	6	21·05	315·79	21·05	63·16	948·14	16·06
Total -	2,443	147	2,880	36	151	60·17	1178·88	14·74	61·81	—	—
HYDERABAD:											
Secunderabad	2,471	176	3,932	62	128	71·23	1591·26	25·09	51·80	1230·93	23·33
Kamptee -	845	50	1,245	16	30	59·17	1473·37	18·93	35·50	1647·54	16·80
Seetabuldee -	48	2	105	—	2	41·67	2187·50	—	41·67	1516·06	12·62
Total -	3,364	228	5,282	78	160	67·78	1570·15	23·19	47·56	—	—
BURMAH:											
Rangoon - -	750	39	975	20	34	52·00	1300·00	26·67	45·33	1214·60	14·09
Thayetmyo - -	618	31	761	11	27	50·16	1231·39	17·79	43·69	1214·40	21·44
Tonghoo - -	398	18	430	14	16	45·23	1080·40	35·18	40·20	990·43	15·56
Port Blair - -	130	6	180	1	1	46·15	1384·62	7·69	7·69	716·86	11·24
Total -	1,896	94	2,346	46	78	49·56	1237·34	24·26	41·14	—	—
TROOPS TREATED AT CONVALESCENT DEPÔTS AND OTHER HOSPITALS:											
Poonamallee -	159	20	237	11	6	125·79	1490·57	69·18	37·74	2385·89	59·41
Wellington -	407	22	427	5	19	54·05	1049·14	12·28	46·68	1413·69	17·47
Ramandroog -	30	4	122	1	—	133·33	4066·67	33·33	—	966·72	6·53
Elsewhere - -	10	—	—	1	—	—	—	100·00	—	—	14·28
Total -	606	46	786	18	25	75·91	1297·03	29·70	41·25	—	—
ON THE MARCH -	152	4	61	14	—	26·32	401·32	92·11	—	660·04	35·27

The following Table, taken from the Principal Medical Officer's report, shows the prevalence and mortality of the different classes of diseases in each of the Administrative Circles :—

Orders.	Divisions	Presidency.		Mysore.		Hyderabad.		Burmah.		Depôts.		On the March.		Presidency.		Mysore.		Hyderabad.		Burmah.		Depôts.		On the March.	
	Average Strength	2,067		2,443		3,364		1,806		596		152		Ratio per 1,000 of Strength.											
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	I. *General Diseases.*																								
1	Febrile Group	1,112	12	519	9	1,499	31	461	8	225	—	9	—	537·96	5·81	212·44	3·68	445·60	9·22	243·14	4·22	377·51	—	59·21	—
2	Constitutional Group	478	3	441	2	611	2	211	1	81	2	5	2	231·25	1·45	180·51	0·82	181·63	0·59	111·29	0·53	135·91	3·36	32·89	13·16
	II. *Local Diseases.* Diseases of the—																								
1	Nervous System	35	9	38	2	39	11	48	8	15	3	1	3	16·93	4·35	15·55	0·82	11·59	3·27	25·32	4·22	25·17	5·03	6·58	19·74
2	Eye	38	—	40	—	64	—	22	—	1	—	—	—	18·38	—	16·37	—	19·02	—	11·60	—	1·68	—	—	—
3	Ear	16	—	25	—	26	—	19	—	1	—	—	—	7·74	—	10·23	—	7·73	—	10·02	—	1·68	—	—	—
4	Nose	1	—	1	—	1	—	1	1	—	—	—	—	0·48	—	0·41	—	0·30	—	0·53	0·53	—	—	—	—
5	Circulatory System	38	1	34	4	58	3	28	3	15	1	1	1	18·38	0·48	13·92	1·64	17·24	0·89	14·77	1·58	25·17	1·68	6·58	6·58
6	Absorbent „	105	—	70	—	96	—	24	—	19	—	—	—	50·79	—	28·65	—	28·54	—	12·66	—	31·88	—	—	—
7	Ductless Glands	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	1·68	1·68	—	—
8	Respiratory System	90	—	93	2	161	3	91	1	10	1	2	—	43·54	—	38·07	0·82	47·86	0·89	48·00	0·53	16·78	1·68	13·16	—
9	Digestive „	402	9	647	12	1,495	25	763	18	258	7	29	4	194·48	4·35	264·84	4·91	444·41	7·43	402·43	9·49	432·88	11·74	190·79	26·31
10	Urinary „	327	—	319	—	432	—	109	—	32	—	6	—	158·20	—	130·58	—	128·42	—	57·48	—	53·69	—	39·47	—
11	Generative „	34	—	49	—	55	—	19	—	15	—	—	—	16·45	—	20·06	—	16·35	—	10·02	—	25·17	—	—	—
12	Organs of Locomotion	11	1	9	—	10	—	8	—	4	—	—	—	5·32	0·48	3·68	—	2·97	—	4·22	—	6·71	—	—	—
13	Cellular Tissue	48	—	48	1	48	—	41	1	11	—	1	—	23·23	—	19·65	0·41	14·27	—	21·62	0·53	18·46	—	6·58	—
14	Cutaneous System	159	—	210	—	195	—	196	—	23	—	2	—	76·92	—	85·96	—	57·97	—	103·37	—	38·59	—	13·16	—
	III. *Conditions, &c.*																								
	Debility	72	—	76	—	108	—	66	—	29	—	1	2	34·83	—	31·11	—	32·10	—	34·81	—	48·65	—	6·58	13·16
	IV. *Poisons*	18	2	16	1	20	—	5	2	3	—	—	—	8·71	0·97	6·55	0·41	8·62	—	2·64	1·06	5·03	—	—	—
	V. *Injuries.*																								
2	Accidental	185	3	240	—	344	—	229	3	43	2	4	1	89·50	1·45	98·24	—	102·26	0·29	120·78	1·58	72·15	3·36	26·31	6·58
4	Self-inflicted	—	—	—	3	1	2	—	—	—	—	—	1	—	—	—	1·23	0·30	0·59	—	—	—	—	—	6·58
	VI. *Surgical Operations.*	1	—	3	—	1	—	—	—	—	—	—	—	0·48	—	1·23	—	0·30	—	—	—	—	—	—	—
	No appreciable Disease	1	—	2	—	9	—	5	—	—	—	—	—	0·48	—	0·82	—	2·68	—	2·64	—	—	—	—	—
	Cause unknown	—	1	—	—	—	—	—	—	—	—	—	—	—	0·48	—	—	—	—	—	—	—	—	—	—
	Total	3,171	41	2,880	36	5,282	78	2,346	46	786	17	61	14	1534·11	19·84	1178·88	14·74	1370·15	23·10	1237·34	24·26	1318·20	28·52	401·32	92·11

Madras.

GENERAL DISEASES.—Compared with 1877 the admission rates under this head are higher in all the circles. In the Presidency and Burmah Circles the increase occurs in the *febrile group* only. In the Hyderabad and Mysore Circles in the *constitutional group* as well. The causes of the increase were as follows, viz.: In the Presidency Circle it is attributed to ague, simple continued and remittent fevers; in Burmah to febricula, ague, and simple continued fever; in Mysore, in the *febrile group*, to ague and febricula, in the *constitutional group* where it is slight, to no particular disease; in the Hyderabad Circle to simple continued and remittent fevers, ague, febricula, and cholera, in the *febrile group* and in the *constitutional group*, chiefly to primary syphilis. The death rates show an increase in all Circles except Mysore, the rate is highest in Hyderabad, and lowest in the Burmah Circle. The increase occurred solely in the *febrile group*, the rate for *constitutional diseases* being less in all Circles except Burmah which shows the same rate as in the preceding year. The large increase noted in the Hyderabad Circle was due in a great degree to cholera.

The admissions and deaths from the principal diseases in this class are shown in the following Table, taken from the Principal Medical Officer's returns:—

Divisions	Presidency.		Mysore.		Hyderabad.		Burmah.		Depôts.		On the March.		Presidency.		Mysore.		Hyderabad.		Burmah.		Depôts.		On the March.	
Average Strength	2,067		2,443		3,364		1,896		596		152		Ratio per 1,000 of Strength.											
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Febrile—																								
Eruptive Fevers	3	—	—	—	19	4	3	—	—	—	—	—	1·45	—	—	—	5·65	1·18	1·58	—	—	—	—	—
Continued "	468	6	373	3	742	3	283	—	66	—	7	—	226·41	2·90	152·68	1·23	220·57	0·89	149·26	—	110·74	—	46·05	—
Paroxysmal "	633	2	132	1	687	3	164	2	156	—	1	—	306·24	0·97	54·03	0·41	204·22	0·89	86·50	1·06	261·74	—	6·58	—
Enteric "	—	—	—	1	7	4	—	—	—	—	—	—	—	—	—	0·41	2·08	1·18	—	—	—	—	—	—
Cholera	5	4	4	4	23	15	9	5	1	—	1	—	2·41	1·93	1·64	1·64	6·83	4·46	4·74	2·63	1·68	—	6·58	—
Influenza	—	—	1	—	17	—	—	—	—	—	—	—	—	—	0·41	—	5·05	—	—	—	—	—	—	—
Erysipelas	—	—	5	—	2	—	2	—	1	—	—	—	—	—	2·04	—	0·59	—	1·06	—	1·68	—	—	—
Other Diseases	3	—	4	—	2	2	—	1	1	—	—	—	1·45	—	1·64	—	0·59	0·59	—	0·53	1·68	—	—	—
Total	1,112	12	519	9	1,499	31	461	8	225	—	9	—	537·98	5·81	212·44	3·68	445·60	9·21	243·14	4·22	377·51	—	59·21	—
Constitutional—																								
Rheumatism	48	—	72	—	126	—	81	—	19	—	1	—	23·22	—	32·34	—	37·45	—	42·72	—	31·88	—	6·58	—
Syphilis	410	—	315	—	468	—	125	—	51	—	3	—	198·35	—	128·94	—	139·12	—	65·93	—	85·57	—	19·74	—
Scrofula, Phthisis, &c.	14	3	23	2	11	2	4	1	9	2	1	2	6·77	1·45	9·41	0·82	3·27	0·59	2·11	0·53	15·10	3·36	6·58	13·16
Scurvy and Purpura	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Anæmia	4	—	20	—	5	—	1	—	2	—	—	—	1·93	—	8·18	—	1·48	—	0·53	—	3·36	—	—	—
Other Diseases	2	—	4	—	1	—	—	—	—	—	—	—	0·97	—	1·64	—	0·29	—	—	—	—	—	—	—
Total	478	3	441	2	611	2	211	1	81	2	5	2	231·25	1·45	180·51	0·82	181·63	0·59	111·28	0·53	135·91	3·36	32·89	13·16

Continued Fevers.—The ratios of admissions for this group are higher than in 1877 for all the Circles. In the Presidency Circle the increase occurred principally at Bellary, in the 2/13th Regiment. In Mysore it was slight. In the Hyderabad Circle it was confined to the troops at Secunderabad, and in Burmah it was chiefly restricted to Rangoon and Thayetmyo.

Paroxysmal Fevers were more prevalent in all the Circles than in 1877, particularly in the Presidency, the increase being most marked at Bellary.

Enteric Fever.—The disease was nearly confined to the Hyderabad Circle and occurred in the 12th Lancers and 1/21st Regiment at Secunderabad, and in the 33rd Regiment at Kamptee. One case, a fatal one, was reported at Bangalore.

The stations where cases of enteric fever occurred, and the months during which they were admitted into hospital, are shown in the following Table, taken from the returns furnished by the Principal Medical Officer :—

Stations.	Average Strength.	Admissions for Enteric Fever.												Total.		Deaths.	
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Number admitted.	Ratio per 1,000 of Strength.	Number died.	Ratio per 1,000 of Strength.
Bangalore - - -	1,610	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	0·62
Secunderabad - -	2,471	—	—	—	—	—	—	—	—	2	1	—	—	3	1·21	3	1·21
Kamptee - - -	845	—	1	—	—	—	—	1	—	1	1	—	—	4	4·73	1	1·18

The ages and periods of residence in India of those attacked by enteric fever are shown in the following Tables, which are taken from the report of the Principal Medical Officer :—

Ages.	Number admitted for Enteric Fever.	Per-centage of Total Admissions from Enteric Fever.	Number of Deaths from Enteric Fever.	Per-centage of Total Deaths from Enteric Fever.
22 to 23 -	2	28·57	1	20·00
23 to 24 -	2	28·57	2	40·00
26 to 27 -	2	28·57	1	20·00
30 to 31 -	1	14·28	1	20·00
Total -	7	100·00	5	100·00

Service in India.	Number admitted for Enteric Fever.	Per-centage of Total Admissions.	Number of Deaths from Enteric Fever.	Per-centage of Total Deaths from Enteric Fever.
Under 1 year -	1	14·28	—	—
1 to 2 years -	1	14·28	2	40·00
2 to 3 „ -	3	42·85	1	20·00
6 to 7 „ -	1	14·28	1	20·00
9 to 10 „ -	1	14·28	1	20·00
Total - -	7	100·00	5	100·00

Madras.

Cholera.—The admission and death rates were higher in the Hyderabad Circle than in 1877, but lower in all other circles.

Rheumatism.—There was an increase in the rate of admissions in all the circles except the Presidency.

Syphilis.—Compared with 1877 there is an increase in the rates of admissions for the Presidency, Mysore, and Hyderabad Circles, and a decrease for Burmah and the Depôts.

Scrofula and Phthisis.—The admission rates are lower in all the Circles than in the preceding year, except in Mysore which shows a slight increase The principal decrease was in Burmah where the rate was less by half.

Anæmia.—Out of 32 admissions, 20 occurred in Mysore.

LOCAL DISEASES.—*Diseases of the Nervous System.*—Compared with 1877 the Presidency Circle shows a slight increase in the admission rate, and the Mysore and Burmah Circles a very large increase, while there was a decrease in Hyderabad. The increase in Mysore was mainly due to neuralgia, and in Burmah to sunstroke and epilepsy, the decrease in Hyderabad was not due to any particular affection. The high death rates in the Mysore and Hyderabad Circles were due to sunstroke. There was a fatal case of hydrophobia at Bellary in a man of the Royal Artillery who was bitten by a dog.

Diseases of the Eye.—The admission rates are higher for the Mysore and Burmah Circles than in 1877, but lower for the Presidency and Hyderabad Circles, and the Depôts.

Diseases of the Circulatory System.—In the Presidency, Mysore, and Hyderabad Circles the rates differ but little from the preceding year, but in Burmah they have nearly doubled, which is due mainly to increased admissions for valvular disease of the heart which contributed a rate of 10 per 1,000 against 2 in 1877. At the Depôts the rate is reduced by more than half, and is due chiefly to fewer admissions for palpitation and valvular disease of the heart.

Diseases of the Respiratory System.—The admission rates are higher for the Mysore and Hyderabad Circles and lower for the Presidency and Burmah Circles than in the preceding year. The increase in Mysore and Burmah is due chiefly to bronchitis.

Diseases of the Digestive System.—Compared with the rates for 1877 the admission rate for the Presidency Circle is lower by 68·85, that for the Burmah Circle by 15·31. and that for the Depôts by 189·40 per 1,000 of the strength. while for the Hyderabad and Mysore Circles the rates are, respectively, 131·91 and 32·35 higher. The death ratio for the Hyderabad Circle is higher by 4·69, that for Mysore by 1·39, that for Burmah by 1·48 per 1,000 of the strength, while that for the Depôts is 1·85 lower, and in the Presidency Circle, 1·26.

The relative prevalence of certain important diseases of this order, in each Division of the Command, is shown in the following Table, taken from the report of the Principal Medical Officer:—

Circles.	Ratio per 1,000 of Strength.											
	Presidency.		Mysore.		Hydera-bad.		Burmah.		Depôts.		On the March.	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Dysentery - - -	38·22	0·48	77·77	1·64	128·42	2·97	95·46	3·69	142·62	6·71	92·10	13·16
Diarrhœa - - -	48·86	0·48	33·15	0·41	110·88	0·29	87·02	—	67·11	—	19·73	6·58
Hepatitis, including abscess of liver -	30·96	3·38	57·71	2·86	55·88	3·56	79·11	5·27	117·44	5·03	52·63	6·59
Total - -	118·04	4·35	168·64	4·91	295·18	6·83	261·60	8·96	327·18	11·74	164·47	26·32
Dyspepsia - - -	35·31	—	46·02	—	78·77	—	88·08	—	58·72	—	26·31	—

The relation between the prevalence and mortality of the diseases specified, is shown in the following Table, taken from the report of the Principal Medical Officer:—

Stations.	Ratio per 1,000 of Strength.					
	1878.		1877.		Average of previous Period of Nine Years. 1869–77.	
	Admitted for Dysentery, Diarrhœa, Hepatitis, including Abscess of Liver.	Died from these Diseases.	Admitted for Dysentery, Diarrhœa, Hepatitis, including Abscess of Liver.	Died from these Diseases.	Admitted for Dysentery, Diarrhœa, Hepatitis, including Abscess of Liver.	Died from these Diseases.
PRESIDENCY:						
Fort St. George and Palaveram.	144·48	4·87	131·00	8·73	128·4	4·58
St. Thomas' Mount -	143·77	6·39	236·76	6·23	222·5	8·74
Trichinopoly - -	167·29	7·43	214·04	3·51	189·3	6·76
Bellary - -	74·80	2·30	118·34	2·36	118·3	1·89
MYSORE:						
Bangalore - -	126·71	3·11	120·81	1·73	143·4	3·40
Cannanore - -	250·00	7·81	250·79	3·15	296·1	7·06
Calicut - -	336·73	20·41	288·66	20·62	234·8	8·39
Malliaporam - -	157·89	—	180·85	10·64	288·3	4·92
HYDERABAD:						
Secunderabad -	364·63	8·90	219·08	3·75	274·2	9·39
Kamptee and Seetabuldee.	103·02	1·12	91·01	—	125·3	2·22
BURMAH:						
Rangoon - -	310·67	12·00	308·41	14·68	240·6	6·34
Thayetmyo - -	192·56	1·62	181·82	3·50	180·1	1·89
Tonghoo - -	314·07	17·59	290·17	2·40	310·5	5·28
Port Blair - -	146·15	—	97·02	—	97·7	1·01

Diseases of the Urinary System.—The admission rate is higher than in the preceding year for Mysore and Hyderabad, but lower in the other Circles and at the Depôts.

POISONS.—Compared with 1877 the ratios show an increase in all the Circles except in Burmah, in which there is a large decrease. The Depôts are almost unchanged.

The extent of sickness, mortality, and invaliding in each Corps serving in the Command are shown in the following Table, which is taken from the report of the Principal Medical Officer: —

Corps.	Average Annual Strength.	Admitted into Hospital.	Deaths in the Command.	Invalided.	Ratio per 1,000 of Strength.			——
					Admissions into Hospital.	Deaths.	Invalids.	
Royal Engineers	32	15	4	1	468·75	125·00	31·25	Head-quarters at Bangalore - 12 months.
CAVALRY.								
12th Lancers	465	707	18	26	1520·43	38·71	55·91	Secunderabad - 12 "
14th Hussars	444	518	6	47	1166·67	13·51	105·86	Bangalore - 12 "
Total	909	1,225	24	73	1347·63	26·40	80·31	
ROYAL ARTILLERY.								
B/B. Bd. Royal Horse Artillery	165	276	3	11	1672·73	18·18	66·67	Secunderabad - 12 "
C/B. " "	172	213	3	10	1232·56	17·44	58·14	Bangalore, 11½, and on the march, ½.
H/1 " Royal Artillery	157	245	2	2	1560·51	12·74	12·74	Secunderabad, 11½. En route to Moultan.
K/1 " "	156	207	2	4	1326·92	12·82	25·64	Thayetmyo - 12 "
L/1 " "	155	208	8	5	1341·94	51·61	32·26	Trichinopoly - 12 "
O/1 " "	166	179	2	8	1078·31	12·05	48·19	Saint Thomas' Mount - 12 "
A/6 " "	138	143	1	2	1036·23	7·25	14·49	Bangalore, 9½. Embarked for England.
B/6 " "	132	233	1	1	1765·15	7·58	7·58	Bellary, 9½. Embarked for England.
C/6 " "	133	156	3	—	1172·93	22·56	—	Saint Thomas' Mount, 9½. Embarked for England.
D/6 " "	165	253	1	18	1533·33	6·06	109·09	Bangalore - 12 "
E/6 " "	146	223	2	8	1527·40	13·70	54·79	Kamptee - 12 "
F/6 " "	167	225	6	17	1347·31	35·93	101·80	Secunderabad - 12 "
G/6 " "	148	270	2	9	1824·32	13·51	60·81	Kamptee, 9½; on the march, ½; and Bellary, 2½.
I/6 " "	20	33	—	—	1650·00	—	—	Saint Thomas' Mount (arrived 16th November), 1½.
K/6 " "	20	31	—	—	1550·00	—	—	Bangalore (arrived 16th November), 1½.
8/8 " "	78	93	9	2	1192·31	115·38	25·64	Tonghoo - 12 "
9/8 " "	84	88	3	1	988·09	35·71	11·90	Tonghoo, 11½; on the march, ½.
10/8 " "	77	104	6	8	1350·65	77·92	103·90	Rangoon - 12 "
11/8 " "	85	116	3	7	1364·71	35·29	82·35	Rangoon - 12 "
12/8 " "	88	89	—	6	1011·36	—	68·18	Rangoon and on the march, ½; Mount, 2; Madras, 9½.
13/8 " "	69	98	3	5	1420·29	43·48	72·46	Cannanore, 9½; en route to Moultan.
14/8 " "	91	187	2	2	2054·94	21·98	21·98	On the march, ½; Secunderabad, 11½.
Total	2,612	3,664	62	126	1402·75	23·74	48·24	

Corps.	Average Annual Strength.	Admitted into Hospital.	Deaths in the Command.	Invalided.	Ratio per 1,000 of Strength.			———
					Admissions into Hospital.	Deaths.	Invalids.	
INFANTRY.								
2/13th Regiment - - - -	687	1,323	10	18	1925·76	14·56	26·20	Bellary (arrived 15th March), 9½.
2/16th „ - - - - -	863	1,323	22	41	1533·02	25·49	47·51	Secunderabad - - - - - - - 12 months.
1/21st Fusiliers - - - -	826	1,174	18	40	1421·31	21·79	48·48	Secunderabad - - - - - - - 12 „
33rd Regiment - - - -	756	1,045	12	18	1382·28	15·87	23·81	Kamptee (detachment at Seetabuldee) - - - - 12 „
45rd „ - - - - -	769	1,000	14	40	1300·39	18·21	52·02	Bellary, 1, and Madras, 11.
Head-quarters, 44th Regiment -	499	636	9	35	1274·55	18·04	42·33	Thayetmyo - - - - - - - - 12 „
Left Wing, 44th Regiment - -	328	294	7		896·34	21·34		Tonghoo - - - - - - - - 12 „
45th Regiment - - - -	103	17	1	1	165·05	9·71	9·71	Bangalore, 1½; embarked for England.
48th „ - - - - -	851	940	17	59	1131·17	20·46	71·00	Cannanore (detachment at Calicut and Malliaporam) - 12 „
67th „ - - - - -	802	837	12	28	1043·64	14·96	34·91	Madras, 1½; Bangalore, 10; en route to Moultan.
89th „ - - - - -	863	1,044	21	18	1209·73	24·34	20·86	Rangoon (detachment at Port Blair) - - - - 12 „
Total - - -	7,327	9,633	143	298	1314·73	19·52	40·67	

Madras.

Officers.

In an average annual strength of 442 officers, 344 were placed on the sick list during the year, and 12 died, being in the annual ratios of 778·24 and 27·15 per 1,000 of the strength. The admission rate is 64·24 lower and the death rate 13·93 higher than in the preceding year.

Simple continued fever, ague, febricula, and diarrhœa were the chief causes of admission. There were 32 officers invalided, giving a ratio of 72·40 per 1,000 of the strength, which is fractionally lower than in 1877.

Women.

The average annual strength of the wives of non-commissioned officers and men was 1,293, there were 1,556 admissions into hospital (including 282 cases of parturition) and 35 deaths, being in the annual ratios of 1243·40 and 27·07 per 1,000 of the strength respectively. The admission rate is higher than in 1877 by 64·24, but the death rate is nearly the same. Febrile diseases and general debility were the principal causes of admission. The deaths were due to enteric fever (1), simple continued fever (3), remittent fever (2), cholera (5), puerperal fever (1), phthisis pulmonalis (3), apoplexy (1), sunstroke (1), mania (1), fatty degeneration of heart (1), angina pectoris (1), pneumonia (1), dysentery (3), diarrhœa (3), hepatitis (1), peritonitis (1), bright's disease (1), metritis (1), post portum hœmorrhage (2), sudden death after delivery (1), delirium tremens (1).

Children.

The average annual strength of the children of the non-commissioned officers and men was 2,617, of these, 1,954 came under medical treatment, and 190 died. The admission rate is 746·37 and the death rate 72·57 per 1,000 of the strength, both being in excess of those for the preceding year Diarrhœa, simple continued fever, and measles were the principal causes of admissions. The deaths were due to measles (6), simple continued fever, (4), remittent fever (2), tubercular meningitis (2), tabes mesenterica (12), purpura (1), meningitis (1), sunstroke (1), hydrocephalus (2), convulsions (63), epilepsy (1), cyanosis (1), croup (3), spasm of glottis (1), bronchitis (13), collapse of lung (1), teething (14), tonsillitis (1), dysentery (14), intestine impervious (1), diarrhœa (30), hepatitis (1), caries of spine (1), premature birth (1), general debility (12), asphyxia by drowning (1).

III.—Bombay.

STATISTICAL REPORT.

The average annual strength of the troops in this Command was 9,882. The admissions into hospital were 17,840 in number, the deaths from all causes, in and out of hospital, and including those of invalids on their passage home, or after their arrival, amounted to 214, and the average daily sick was 637. The admission rate is therefore 1805·3 per 1,000 of the strength, or 455·3 higher, the death rate 21·65 or 8·73 higher, and that of the constantly sick 64·46, or 7·99 higher than for the preceding year. *Bombay.*

The admissions and deaths in each class and order of diseases are shown in the following Table:—

Orders.	Diseases.	Strength, 9,882.				1878.		1869–77.	
			Deaths.			Annual Ratio per 1,000.		Annual Ratio per 1,000.	
		Admitted.	In the Command.	Of Invalids.	Total.	Admitted.	Died.	Admitted.	Died.
	I. *General Diseases.*								
1	Febrile Group	8,935	85	—	85	904·1	8·60	600·4	4·52
2	Constitutional „	1,473	11	8	19	149·1	1·92	1	2·02
	II. *Local Diseases.*								
	Diseases of the—								
1	Nervous System	178	25	1	26	18·0	2·63	16·4	2·19
2	Eye	176	—	—	—	17·8	—	24·7	—
3	Ear	69	—	—	—	7·0	—	6·7	·01
4	Nose	6	—	—	—	·6	—	·6	—
5	Circulatory System	135	6	1	7	13·7	·71	13·8	1·09
6	Absorbent „	168	—	—	—	17·0	—	22·2	—
7	Ductless Glands	1	—	—	—	·1	—	—	—
8	Respiratory System	402	1	—	1	40·7	·10	41·4	·73
9	Digestive „	2,484	47	4	51	251·4	5·16	218·4	3·65
10	Urinary „	1,233	2	—	2	124·8	·20	88·0	·19
11	Generative „	118	—	—	—	11·9	—	10·7	·01
12	Organs of Locomotion	36	1	—	1	3·6	·10	4·5	·04
13	Cellular Tissue	158	—	—	—	16·0	—	17·1	·01
14	Cutaneous System	727	—	—	—	73·6	—	69·6	·01
	III. *Conditions, &c.*								
	Debility	457	—	—	—	46·3	—	22·9	·03
	IV. *Poisons*	86	3	—	3	8·7	·30	8·7	·28
	V. *Injuries.*								
1	Battle	—	—	—	—	—	—	—	—
2	Accidental	960	5	—	5	97·1	·51	90·7	·86
3	Homicidal	1	—	—	—	·1	—	·1	·06
4	Self-inflicted	3	14	—	14	·3	1·42	·2	·52
5	Judicial	1	—	—	—	·1	—	—	·06
	VI. *Surgical Operations*	1	—	—	—	·1	—	·2	·03
	No appreciable Disease	31	—	—	—	3·1	—	·7	—
	Cause unknown	1	—	—	—	·1	—	—	—
	Total	17,840	200	14	214	1805·3	21·65	1398·0	16·31
	Average of 10 years, 1868–77	—	—	—	—	1386·8	16·43	—	—

Bombay.

GENERAL DISEASES.—The rate of admissions for this class exceeds that of the preceding year by 428·7, and the death rate is also higher by 5·99 per 1,000 of the strength. The increase occurs both in the febrile and constitutional groups, but particularly so in the febrile, where the rate is 408·9 per 1,000 men higher.

The admissions and deaths caused by the principal diseases of this class are shown in the following Table:—

Strength - - - - 9,882			Ratio per 1,000 of Strength.			
			1878.		1869–77.	
General Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Febrile Group—						
Eruptive Fevers - -	21	2	2·1	·20	1·5	·05
Continued „ - -	1,321	25	133·7	2·53	135·3	1·74
Yellow Fever - - -	—	—	—	—	—	—
Paroxysmal Fevers - -	7,521	11	761·1	1·11	458·7	·97
Cholera - - -	57	47	5·7	4·76	2·5	1·66
Influenza - - -	6	—	·6	—	·7	—
Erysipelas - - -	7	—	·7	—	1·3	·05
Other Diseases - -	2	—	·2	—	·4	·05
Total - - -	8,935	85	904·1	8·60	600·4	4·52
Constitutional Group—						
Rheumatism - - -	382	1	38·7	·10	39·8	·05
Syphilis - - -	1,009	2	102·1	·20	84·0	·11
Scrofula, Phthisis, &c. - -	56	14	5·7	1·42	8·7	1·61
Scurvy and Purpura - -	10	—	1·0	—	·5	·05
Anæmia - - -	9	—	·9	—	6·0	·04
Other Diseases - -	7	2	·7	·20	1·0	·16
Total - - -	1,473	19	149·1	1·92	140·0	2·02

Eruptive Fevers.—The rate of admissions is fractionally lower than in the preceding year. Of the 21 admissions, 4 were for small-pox, 6 for chicken-pox, 10 for measles, and 1 for scarlet fever. The two deaths were from small-pox, one of which occurred in a man of the 2nd Battalion 15th Regiment at Ahmedabad, and the other in the same corps at Baroda.

Continued Fevers.—The rate of admissions is 36·9 per 1,000 of the strength higher than that for 1877, and the death rate is also higher by 1·06. 47 of the admissions were for *Enteric Fever*, and all the deaths (25) were due to this form of disease, the admission rate for which is 4·8 per 1,000, and the death rate 2·5 or 1·3 and 1·0 respectively higher than for 1877, and is also far in excess of the average rates of admissions and deaths for 10 years. The principal medical officer thinks this increase may not be actual, but due, perhaps, to more accurate diagnosis on the part of the medical officers, cases that would formerly have been shown as simple continued fever being now returned as enteric. This fever was most prevalent in the last half of the year.

Paroxysmal Fevers.—The rate of admissions is 368·3 higher and that of deaths ·72 per 1,000 men higher than that for the preceding year. This great increase is attributed by medical officers in charge of corps, to the excessive rainfall during the year.

Cholera.—The rate of admissions is 4·2, and that of deaths 3·76 per 1,000 men higher than that for 1877. More than half the cases occurred during

the rainy season, and 30 of the 57 admissions took place at Neemuch and Nasirabad in the 68th Regiment and G Battery of the 2nd Brigade, Royal Artillery; 4 or 5 cases in Bombay occurred in the F Battery, 2nd Brigade, Royal Artillery, while encamped on the Esplanade prior to embarkation for Malta, and the disease was said to have been imported from Kirkee where the battery had previously been stationed; a case also appeared on board ship on their voyage subsequently to Malta. *Bombay.*

Rheumatism.—The rate of admissions is slightly in excess of that of the preceding year.

Syphilis.—The rate of admissions is higher by 17·9 per 1,000 of the strength than that for 1877. 797 were cases of primary, and 212 of secondary disease, The highest ratio is furnished by Satara where the rate is 354 per 1,000 men, which the principal medical officer states may be accounted for by the absence of a Lock Hospital.

Scrofula and Phthisis.—Compared with the preceding year, there is a fractional increase both in the rates of admission and deaths.

LOCAL DISEASES.—Compared with 1877, higher rates are observed for diseases of the *nervous, circulatory, digestive* (where the increase is considerable), *urinary*, and *cutaneous* systems, and diseases of the *nose*, but lower rates for the other groups in this class. The rate of mortality for diseases of the *digestive* system is 2·99 higher than in the preceding year, but the rates for the other groups show but little change.

CONDITIONS.—*Debility.*—The rate of admissions is 9·5 higher than for 1877.

POISONS.—The rate of admissions is a little lower, and the death rate a little higher than in the preceding year. 54 of the admissions are returned under the head of alcoholic poisoning, and 32 as delirium tremens.

INJURIES.—*Accidental.*—The rate of admissions is 9·3, and that of deaths ·87 per 1,000 men lower than for the preceding year. Two of the deaths were caused by asphyxia by drowning, 1 by concussion of the brain, 1 by fracture, and 1 by gunshot wound.

Self-inflicted.—The rate differs but little from last year.

The admissions and deaths in the principal stations in the Command are shown in the following Table furnished by the Principal Medical Officer:—

Military Divisions.	Stations.	Annual Average Strength.	Number of Admissions.	Number of Deaths.	Ratio per 1,000 of the Strength.			
							Average of 10 Years, 1868–77.	
					Admissions.	Deaths.	Admissions.	Deaths.
Presidency Circle.	Bombay -	521	1,517	7	2911·71	13·14	1720·2	15·03
	Deolali -	240	324	3	1350·00	12·50	*2580·0	30·63
	Ahmedabad -	180	479	6	2661·11	33·33	2005·5	24·43
	Deesa -	637	963	10	1511·77	15·70	1282·0	16·90
	Baroda -	188	520	5	2765·96	26·60	†1736·3	36·94
	Mount Aboo -	88	85	1	965·91	11·36	1787·6	17·70
	Kurrachi -	751	1,098	12	1457·89	15·98	1492·5	14·66
	Ghirzri -	3	1	—	333·33	—	—	—
	Hyderabad -	390	599	6	1535·90	15·38	1424·4	13·99
	Aden -	805	803	15	997·52	18·63	1084·9	13·94
Poona Circle.	Poona -	1,350	1,926	20	1426·67	14·81	1364·2	12·72
	Ahmednagar -	301	393	6	1305·65	19·93	1193·0	9·54
	Kirkee -	447	1,108	6	2478·75	13·42	1293·1	12·62
	Satara -	161	311	2	1931·06	12·42	1098·7	12·49
	Purandhar -	11	3	—	272·73	—	—	—
	Belgaum -	885	1,622	12	1832·77	13·56	943·4	8·28

* ve years only. † For three years only.

Bombay.

Military Divisions.	Stations.	Annual Average Strength.	Number of Admissions.	Number of Deaths.	Ratio per 1,000 of the Strength.			
					Admissions.	Deaths.	Average of 10 years, 1868–77. Admissions.	Average of 10 years, 1868–77. Deaths.
Mhow Circle.	Mhow	1,365	2,880	21	2109·89	15·38	1549·1	11·62
	Nasirabad	599	1,261	25	2105·18	41·74	1485·3	12·58
	Neemuch	439	1,257	23	2863·33	52·39	1773·0	22·90
	Asirgarh	32	117	1	3656·25	31·25	1378·0	13·19
	Indore	69	140	5	2028·99	72·46	1485·3	12·58
	On March	372	288	8	774·19	21·51	882·5	11·15
	Convalescents at Depôts, and Sanitaria	213	463	7	2173·71	32·86	2160·2	60·62

The rate of admissions is higher than in 1877 for Bombay by 382 per 1,000 of strength, for Ahmedabad by 1,209, for Deesa by 467, for Baroda by 623, for Mount Aboo by 101, for Kurrachi by 374, for Kirkee by 1,143, for Satara by 326, for Belgaum by 761, for Mhow by 662, for Nasirabad by 847, for Nemuch by 1,347, and for Indore by 166. For the other stations the ratio is lower, but the decrease is small in all instances. The large increase in the stations enumerated, was due to an unusual prevalence of fevers.

The admissions and deaths in the various classes and orders of diseases are shown in the following Table furnished by the Principal Medical Officer:—

Orders.	Military Divisions	Presidency.		Poona.		Mhow.		Troops on March.		Convalescents and Invalids.		Presidency.		Poona.		Mhow.		Troops on March.		Convalescents and Invalids.	
	Average Annual Strength	3,683		3,146		2,504		258		213		Ratio per 1,000.									
	Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	I. *General Diseases.*																				
1	Febrile Group	3,334	15	2,624	15	2,765	45	137	8	127	3	905·24	4·07	834·07	4·77	1104·23	17·97	531·01	31·01	599·06	14·15
2	Constitutional „	373	4	704	5	319	—	33	—	52	—	101·28	1·09	223·78	1·59	139·38	—	127·91	—	245·28	—
	II. *Local Diseases.*																				
	Diseases of the—																				
1	Nervous System	68	14	33	3	74	7	1	—	6	—	18·46	3·80	10·49	·95	29·55	2·80	3·87	—	28·30	—
2	Eye	76	—	46	—	54	—	3	—	10	—	20·64	—	14·62	—	21·57	—	11·63	—	47·17	—
3	Ear	37	—	9	—	23	—	—	—	1	—	10·05	—	2·86	—	9·19	—	—	—	4·72	—
4	Nose	2	—	1	—	2	—	—	—	—	—	·54	—	·32	—	·80	—	—	—	—	—
5	Circulatory System	49	4	24	2	54	2	—	—	10	1	13·30	1·09	7·63	·64	21·57	·80	—	—	47·17	4·72
6	Absorbent	53	—	64	—	42	—	1	—	9	—	14·39	—	20·34	—	16·77	—	3·87	—	42·45	—
7	Ductless Glands	—	—	—	—	1	—	—	—	—	—	—	—	—	—	·40	—	—	—	—	—
8	Respiratory System	130	—	91	—	156	—	14	—	4	—	35·30	—	28·93	—	62·30	—	54·26	—	18·87	—
9	Digestive „	901	16	568	11	922	17	40	—	119	3	244·64	4·34	180·55	3·50	368·21	6·79	155·04	—	561·33	14·15
10	Urinary „	333	2	483	—	372	—	29	—	26	—	90·42	·54	153·53	—	148·56	—	112·40	—	122·64	—
11	Generative „	36	—	54	—	23	—	3	—	4	—	9·77	—	17·16	—	11·18	—	11·63	—	18·87	—
12	Organs of Locomotion	15	—	12	—	8	1	—	—	2	—	4·07	—	3·81	—	3·19	·40	—	—	9·43	—
13	Cellular Tissue	48	—	52	—	51	—	3	—	3	—	13·03	—	16·53	—	20·37	—	11·63	—	14·15	—
14	Cutaneous System	334	—	167	—	223	—	2	—	15	—	90·69	—	53·08	—	89·06	—	7·75	—	70·75	—
	III. *Debility*	122	—	79	—	205	—	4	—	64	—	33·13	—	25·11	—	81·87	—	15·50	—	301·89	—
	IV. *Poisons*	51	2	19	1	24	—	—	—	—	—	13·85	·54	6·04	·32	9·58	—	—	—	—	—
	V. *Injuries.*																				
2	Accidental	362	—	313	5	286	1	16	—	4	—	98·29	—	99·49	1·59	114·22	·40	62·02	—	18·87	—
3	Homicidal	1	—	—	—	—	—	—	—	—	—	·27	—	—	—	—	—	—	—	—	—
4	Self-inflicted	3	3	1	4	1	2	—	—	—	—	·81	2·17	·32	1·27	·40	·80	—	—	—	—
5	Judicial	1	—	—	—	—	—	—	—	—	—	·27	—	—	—	—	—	—	—	—	—
	VI. *Surgical Operations*	—	—	1	—	—	—	—	—	—	—	—	—	·32	—	—	—	—	—	—	—
	No appreciable Disease	22	—	2	—	3	—	—	—	3	—	5·97	—	·64	—	1·20	—	—	—	14·15	—
	Cause unknown	33	—	16	—	12	—	2	—	4	—	8·96	—	5·09	—	4·79	—	7·75	—	18·87	—
	General Total	6,384	65	5,363	46	5,655	75	238	8	463	7	1733·37	17·65	1704·70	14·62	2258·38	29·95	1116·28	31·01	2183·96	33·02

Bombay.

GENERAL DISEASES.—Compared with the preceding year, there is an increase in the rate of admissions for the Presidency Division of 293 per 1,000 men, for the Poona Division of 465, and for the Mhow Division of 680; for the Depôts it is 60 lower. The death rate is higher for the Presidency Division by ·99 per 1,000 men, for the Poona by 1·07, for Mhow by 15·57, and for the Depôts by 1·65. The very high rate of mortality in the Mhow Division is due chiefly to *cholera* and *enteric* and *remittent fevers*.

The admissions and deaths from the principal diseases in the febrile and constitutional groups are shown in the following Table taken from the Principal Medical Officer's report:—

Military Divisions	Presidency.		Poona.		Mhow.		Troops on March.		Convalescents and Invalids.	
Average Annual Strength	3,653		3,146		2,504		258		212	
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Febrile.										
Eruptive Fevers	8	2	2	—	11	—	—	—	—	—
Continued „	705	9	160	3	447	11	6	—	10	2
Paroxysmal „	2,609	1	2,446	4	2,268	3	126	3	116	1
Cholera	6	3	10	8	36	31	5	5	—	—
Influenza	1	—	4	—	2	—	—	—	—	—
Erysipelas	4	—	1	—	1	—	—	—	1	—
Other Diseases	1	—	1	—	—	—	—	—	—	—
Total	3,334	15	2,624	15	2,765	45	137	8	127	3
Constitutional.										
Rheumatism	106	1	130	—	131	—	4	—	13	—
Syphilis	227	—	543	1	194	—	26	—	30	—
Scrofula, Phthisis, &c.	21	3	21	2	9	—	3	—	6	—
Scurvy and Purpura	—	—	7	1	3	—	—	—	—	—
Anæmia	2	—	—	—	9	—	—	—	1	—
Other Diseases	7	—	3	1	3	—	—	—	1	—
Total	373	4	704	5	349	—	33	—	51	—

(*continued.*)

Military Divisions	Presidency.		Poona.		Mhow.		Troops on March.		Convalescents and Invalids.	
Average Annual Strength	Ratio per 1,000 of Strength.									
Diseases.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Febrile.										
Eruptive Fevers	2·17	·54	·64	—	4·39	—	—	—	—	—
Continued „	191·42	2·44	50·86	·95	178·51	4·39	23·26	—	47·17	9·45
Paroxysmal „	708·39	·27	777·50	1·27	905·75	1·20	488·37	11·63	547·17	4·72
Cholera	1·63	·81	3·17	2·55	14·38	12·38	19·38	19·38	—	—
Influenza	·27	—	1·27	—	·79	—	—	—	—	—
Erysipelas	1·09	—	·32	—	·39	—	—	—	4·72	—
Other Diseases	·27	—	·32	—	—	—	—	—	—	—
Total	905·24	4·07	834·07	4·77	1104·23	17·97	531·01	31·01	599·06	14·15
Constitutional.										
Rheumatism	28·78	·27	41·32	—	52·32	—	15·50	—	61·32	—
Syphilis	64·35	—	172·60	·32	77·48	—	100·78	—	141·51	—
Scrofula, Phthisis, &c.	5·70	·81	6·68	·64	3·59	—	11·63	—	28·30	—
Scurvy and Purpura	—	—	2·23	·32	1·20	—	—	—	—	—
Anæmia	·54	—	—	—	3·59	—	—	—	4·72	—
Other Diseases	1·90	—	·95	·32	1·20	—	—	—	4·72	—
Total	101·28	1·09	223·78	1·59	139·38	—	127·91	—	240·57	—

Eruptive Fevers.—There were a few admissions for fevers of this nature in all the Divisions, the highest number (11) having occurred in Mhow, 16 of the 21 shown in the table were cases of measles and chicken-pox. The two deaths were from small-pox, and occurred in the Bombay Division.

Continued Fevers.—Compared with the preceding year, the rate of admissions

is higher for the Presidency Division by 65, for Mhow by 66, and for the Depôts by 18 per 1,000 of the strength, but lower for Poona by 17 per 1,000. The death rate for these fevers is higher for the Presidency Division by ·22, and for Mhow by 3·59, while it is lower for Poona by ·44 per 1,000.

Enteric Fever.—The relation of *enteric fever*, to locality, and to season in the present year, is shown in the following Table taken from the report of the Principal Medical Officer :—

Divisions and Stations.	January.		February.		March.		April.		May.		June.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Presidency — Deesa	1	—	—	1	—	—	—	—	—	—	—	—
Presidency — Ahmedabad	—	—	—	—	—	—	—	—	—	—	—	—
Presidency — Aboo	—	—	—	—	—	—	—	—	—	—	—	—
Presidency — Baroda	1	—	—	—	—	—	—	—	—	—	—	—
Presidency — Kurrachi	—	—	—	—	1	—	1	—	—	1	—	—
Presidency — Ghizri	—	—	—	—	—	—	—	—	—	—	1	—
Presidency — Colaba	—	—	—	—	—	—	—	—	—	—	—	—
Presidency — Aden	—	—	—	—	—	—	—	—	—	—	—	—
Poona — Purandhar	—	—	—	—	—	—	1	—	—	1	—	—
Poona — Belgaum	—	—	—	—	—	—	1	—	—	—	—	—
Poona — Poona	—	—	—	—	—	—	—	—	—	—	—	—
Mhow — Mhow	—	—	—	—	—	—	—	—	—	—	—	—
Mhow — Indore	—	—	—	—	—	—	1	—	—	—	—	—
Mhow — Nasirabad	—	—	—	—	—	—	—	—	—	—	—	—
Total	2	—	—	1	1	—	4	—	—	2	1	—

(*continued.*)

Divisions and Stations.	July.		August.		September.		October.		November.		December.		Total.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Presidency — Deesa	—	—	1	—	9	3	1	—	—	1	—	—	13	5
Presidency — Ahmedabod	—	—	—	—	—	—	2	1	1	1	—	—	3	2
Presidency — Aboo	—	—	2	—	—	—	—	—	—	—	—	—	2	—
Presidency — Baroda	—	—	—	—	—	—	—	—	—	—	—	—	1	—
Presidency — Kurrachi	—	—	—	—	—	—	1	1	—	—	—	—	3	2
Presidency — Ghizri	—	1	—	—	—	—	—	—	—	—	—	—	1	1
Presidency — Colaba	—	—	—	—	—	—	—	—	—	—	2	—	2	—
Presidency — Aden	—	—	—	—	—	—	—	—	—	—	1	—	1	—
Poona — Purandhar	1	—	—	—	—	—	—	—	—	—	—	—	2	1
Poona — Belgaum	3	2	1	—	1	—	—	—	—	—	—	—	5	3
Poona — Poona	—	—	—	—	—	—	—	—	—	—	1	—	1	—
Mhow — Mhow	—	—	—	—	4	4	4	3	1	2	—	—	9	9
Mhow — Indore	—	—	—	—	—	—	—	—	—	—	—	—	1	—
Mhow — Nasirabad	—	—	—	—	—	—	—	—	3	2	1	—	4	2
Total	4	3	4	—	13	8	8	5	5	6	5	—	47	25

While in 1877 there was no marked inequality in the admissions for *enteric fever* throughout the several seasons of the year, it may be seen from this table that in the one under report nearly four-fifths of the cases occurred in the last half of the year. 14 out of 23 stations of the Presidency were attacked, showing the wide distribution of the fever, and while Kurrachi furnished the greatest number of cases in the preceding year, Deesa and Mhow supplied nearly half the admissions in the present year.

Paroxysmal Fevers.—The rate of admissions for these fevers is much higher for all the Circles than in the preceding year.

The proportional prevalence of paroxysmal fevers at the several stations in the Command, in the present and in the preceding year, are shown in the following Table, taken from the report of the Principal Medical Officer :—

Bombay.

Stations.	Ratio of Admissions per 1,000 of the Strength.		Stations.	Ratio of Admissions per 1,000 of the Strength.	
	1878.	1877.		1878.	1877.
Asirgarh -	2187·5	—	Teerhul -	583·3	—
Bombay -	1842·8	1630·1	Deolali -	492·2	157·1
Ahmedabad -	1600·0	587·9	Poona -	491·8	400·0
Kirkee -	1584·7	332·1	Deesa -	488·2	319·6
Neemuch -	1050·1	469·7	Kurrachi -	423·4	182·2
Belgaum -	1047·5	306·6	Aboo -	409·1	310·8
Nasirabad -	929·9	246·1	On March -	338·7	74·6
Taraghar -	904·8	295·5	Ghisri -	258·1	1384·6
Mhow - -	858·6	365·2	Khandalla -	242·4	315·7
Hyderabad -	810·3	597·5	Ahmednagar -	222·6	347·9
Satara - -	664·6	464·9	Aden - -	166·5	108·8
Baroda - -	622·3	497·7	Indore -	115·9	68·6
Purandhar -	598·1	565·6			

Cholera.—Cases occurred in all the Divisions, but more than half the admissions took place in the Mhow Division at Neemuch and Nasirabad where there was a severe outbreak of the disease in the 68th Regiment and in G Battery, 2nd Brigade, Royal Artillery.

Rheumatism.—The rate of admissions is lower for the Presidency Division by 4·82 per 1,000 men, higher for Poona by 7·52, and for Mhow by 5·12, whilst for the Depôts it is 9·48 lower than in the preceding year.

Syphilis.—Compared with 1877 the rate of admissions is higher for the Poona and Mhow Divisions, but lower for the Presidency and Depôts.

Scrofula and Phthisis.—The rates of admissions are higher for the Presidency and Poona Divisions than in the preceding year, but lower for Mhow and the Depôts. All the deaths occurred in the Presidency and Poona Divisions.

Local Diseases.—*Diseases of the Nervous System.*—The rates of admissions are higher for the Mhow Division and the Depôts, than in the preceding year, but lower for the Presidency and Poona Divisions. The death rates are a little higher in all the Divisions, but lower considerably at the Depôts.

Diseases of the Eye.—Compared with the preceding year the rates of admissions are higher for the Presidency Division and the Depôts, but lower for the Poona and Mhow Divisions.

Diseases of the Circulatory System.—The rate of admissions is higher for Poona and the Depôts, but lower for the Presidency and Mhow Divisions than in 1877. The death rate is also a little higher in all Divisions but most so at the Depôts.

Diseases of the Respiratory System.—Compared with 1877 the rate of admissions is higher for the Presidency Division, but lower for the other Divisions and the Depôts.

Diseases of the Digestive System.—Compared with the preceding year there is a considerable increase in the rate of admissions in all the Divisions except Poona in which there is a large decrease. There is also an increase at the Depôts, and the death rates are higher for all the Divisions and the Depôts.

Diseases of the Urinary System.—The rates of admissions are higher than in the preceding year in all the Divisions but lower for the Depôts.

Conditions and Debility.—The rates of admissions do not differ very materially in the various Divisions from the preceding year, but there is a large increase in the Depôts.

Poisons.—The rate of admissions is a little higher for the Presidency Division than that for the preceding year, and a little lower for the other Divisions.

Injuries.—*Accidental.*—The rate of admissions is 4·1 per 1,000 men lower for the Presidency Division than in the preceding year. For the Poona Division by 8·1. For the Mhow Division by 4·48, for the troops on the march by 28·88, and for the Depôts by 39·43 per 1,000. *Self-inflicted* caused the admission of three men in the Presidency Division, and one respectively in Poona and Mhow. Eight of the suicidal deaths occurred in the Presidency Division, four at Poona, and two at Mhow.

The following Table, taken from the Report of the Principal Medical Officer, shows the strength, the number of admissions and deaths, and the invaliding in each Corps and arm of the Service, and the ratios of those numbers per 1,000 of the strength during the year.

Corps.	Average Strength.	Admission into Hospital.			Deaths in and out of Hospital.			Invalids.	Ratio per 1,000.		
		From General Diseases.	From other Diseases.	Total.	From General Diseases.	From other Diseases.	Total.		Admissions.	Deaths.	Invalids.
CAVALRY.											
3rd Hussars	390	318	425	743	3	3	6	35	1905·13	15·38	89·74
ARTILLERY.											
D/B Royal Horse Artillery	158	316	167	483	1	—	1	9	3056·96	6·33	56·96
E/B " "	163	190	144	334	—	1	1	15	2049·08	6·13	92·02
Hd. Qrs. A/3 Royal Artillery	164	273	176	449	1	2	3	10	2737·80	18·29	60·98
B/2 "	151	118	209	327	4	2	6	2	2165·56	39·74	13·25
C/2 "	155	163	107	270	1	1	2	7	1741·94	12·90	45·16
D/2 "	134	161	124	285	1	5	6	11	2126·86	44·78	84·34
E/2 "	153	346	154	500	—	3	3	14	3289·47	19·74	92·11
F/2 "	92	204	65	269	5	—	5	10	2923·91	54·35	108·70
G/2 "	156	189	183	372	3	6	9	16	2384·63	57·69	102·56
Royal Artillery Bombay Dist. staff.	4	1	—	1	—	—	—	—	250·00	—	—
No. 15/8 Royal Artillery	83	12	64	76	—	3	3	5	915·66	36·14	60·24
" 16/8 "	83	113	78	191	—	2	2	1	2301·20	24·10	12·05
" 17/8 "	86	41	106	147	—	—	—	6	1709·30	—	69·77
" 18/8 "	76	50	57	107	1	3	4	7	1407·89	52·63	92·11
" 19/8 "	80	142	83	225	—	2	2	9	2812·50	25·00	112·50
" 1/9 "	72	27	56	83	—	2	2	12	1152·78	27·78	166·67
" 5/8 "	6	5	4	9	—	—	—	—	1500·00	—	—
Head Quarters 9th Brigade Royal Artillery.	5	—	—	—	—	—	—	—	—	—	—
I/1 Royal Artillery	131	62	74	136	—	—	—	4	1038·18	—	30·53
M/1 " "	76	70	47	117	1	—	1	1	1539·47	13·16	13·16
N/1 " "	148	58	101	159	1	1	2	11	1074·32	13·51	74·32
	2,175	2,541	1,999	4,540	19	33	52	150	2087·36	23·91	68·97
Royal Engineers (*Bombay Sappers and Miners*).	38	15	7	22	—	1	1	4	578·95	26·31	105·26
INFANTRY.											
1/2nd Queens	716	792	466	1,258	5	5	10	23	1756·98	13·97	32·12
1/8th Foot	588	258	292	550	1	6	7	26	935·37	11·90	44·22
1/14th "	26	12	27	39	—	—	—	15	1500·00	—	576·92
2/7th "	769	950	383	1,333	2	7	9	26	1733·42	11·70	33·81
Left Wing	17	44	7	51	—	—	—	—	3000·00	—	—
2/11th Foot	872	663	509	1,172	4	6	10	22	1344·04	11·47	25·23
2/15th "	850	651	635	1,286	8	8	16	33	1512·94	18·82	38·82
2/17th "	911	1,209	890	2,099	18	8	26	81	2304·06	28·54	88·91
56th "	13	—	2	2	—	—	—	—	153·85	—	—
66th "	841	1,242	745	1,987	3	12	15	33	2365·48	17·86	45·18
83rd "	763	917	560	1,477	26	9	35	89	1935·78	45·87	116·64
85rd "	913	827	454	1,281	5	8	13	36	1403·07	14·24	39·43
	7,279	7,565	4,970	12,535	72	69	141	389	1722·08	19·37	53·44
	9,882	10,439	7,401	17,840	94	103	200	578	1805·30	20·24	58·49

From this table it will be seen that the amount of sickness and invaliding was higher in the Cavalry and Artillery than in the Infantry, and that the death rate was highest in the Engineers, and lowest in the Cavalry.

Officers.

In an average annual strength of 364 officers, serving in the Command, there were 341 admissions, 3 deaths, and 44 were invalided to England, being in the annual rates of 937, of 8·24, and 120·88 per 1,000 of the strength respectively. Fevers, bowel complaints, and hepatitis were the principal causes of the admissions. Ague alone contributed nearly one-fourth of the whole. The deaths were due to apoplexy (1), ulcer of tongue (1), gunshot wound, suicide (1). The principal causes of invaliding were general debility and ague.

The following Table, taken from the Report of the Principal Medical Officer, shows the comparative mortality and invaliding in the three grades of commissioned officers, non-commissioned officers, and privates during the year under report, and for the nine previous years.

Years.	Average Strength.			Number of Deaths.			Invalided.			Ratio per 1,000.					
										Deaths.			Invalids.		
	Commissioned Officers.	Non-commissioned Officers.	Privates.	Commissioned Officers.	Non-commissioned Officers.	Privates.	Commissioned Officers.	Non-commissioned Officers.	Privates.	Commissioned Officers.	Non-commissioned Officers.	Privates.	Commissioned Officers.	Non-commissioned Officers.	Privates.
1869 - - -	520	1,245	9,292	1	32	195	45	35	228	1·92	25·70	20·98	86·54	28·11	24·54
1870 - - -	517	1,211	9,346	5	26	147	46	42	319	9·66	21·47	15·73	88·97	34·66	34·13
1871 - - -	496	1,216	9,620	5	33	118	37	27	219	10·08	27·05	12·27	74·59	22·20	22·77
1872 - - -	443	1,199	9,699	10	32	173	34	30	282	22·55	26·69	17·84	76·75	25·02	29·03
1873 - - -	397	1,150	9,523	7	16	109	38	47	379	17·63	13·91	11·44	95·72	40·87	39·80
1874 - - -	385	1,189	9,439	1	16	97	27	65	376	2·59	14·05	10·28	70·13	57·07	39·83
1875 - - -	363	1,163	9,170	7	33	181	33	55	573	11·02	28·37	19·74	90·91	47·29	62·49
1876 - - -	368	1,179	9,111	5	18	110	43	49	433	13·59	15·27	12·07	116·85	41·56	47·52
1877 - - -	375	1,160	8,989	4	13	108	35	63	427	10·67	11·21	12·01	93·33	54·31	47·50
Average for 9 years -	429	1,185	9,354	5	24	138	38	46	360	11·64	20·54	14·71	87·47	38·74	38·44
1878 - - -	364	1,316	8,588	3	34	166	44	86	492	8·24	25·84	19·33	120·88	65·35	57·29

Women.

The average strength of the wives of non-commissioned officers and private soldiers was 986. There were 1,067 admissions into hospital, (excluding cases of child-birth), and 21 deaths, being in the annual ratios of 1,082 and 21·30 per 1,000 of the strength respectively. These rates are considerably higher for the admissions, and lower for the deaths than those for the preceding year. Continued and paroxysmal fevers, general debility, dysentery, and diarrhœa, were the principal causes of the admissions. One-third of the deaths were due to cholera. Remittent fever and diarrhœa were the next chief causes of mortality.

Children.

The average strength of the children of the non-commissioned officers and private soldiers was 2,064. Of these 1,712 came under treatment, and the deaths amounted to 181. The admission rate was therefore 829·46, and the death rate 87·69 per 1,000 of the strength respectively, both rates being largely in excess of those for the preceding year, and higher than the average for 10 years, which was due to an increased prevalence of malarious fevers. The great bulk of the admissions were for fevers, dysentery, diarrhœa, diseases of the eye, general debility, and teething, and the chief causes of mortality were dysentery and diarrhœa, fevers, convulsions, teething, and general debility.

India.

Section II.

On the Extent of Invaliding.

In a strength of 56,109 non-commissioned officers and men in India there were 2,583 soldiers sent home as invalids, being in the proportion of 46·04 per 1,000 of the annual average strength, a rate higher by 4·10 per 1,000 men than that for last year. The rate for the Bengal Command is 3·89 higher, that for Bombay 10·26 higher, and that for Madras ·53 lower than last year. The ratio of men finally discharged the service is 6·20 per 1,000 of the strength higher than in 1877.

The classes and orders of diseases for which men were invalided from the three Commands in India, are shown in the following Table:—

Orders.	Command	Invalids sent home from— Bengal.	Madras.	Bombay.	Invalids from India discharged the Service.
	Strength	35,347	10,880	9,882	56,109
	I. *General Diseases.*				
1	Febrile Group	57	1	56	7
2	Constitutional Group	271	72	88	227
	II. *Local Diseases.*				
	Diseases of the—				
1	Nervous System	92	26	36	53
2	Eye	19	10	8	42
3	Ear	18	6	3	23
4	Nose	1	—	—	—
5	Circulatory System	128	49	48	169
6	Absorbent „	1	—	2	1
7	Ductless Glands	—	—	—	—
8	Respiratory System	55	20	17	41
9	Digestive „	298	144	106	158
10	Urinary „	26	8	14	18
11	Generative „	4	1	4	2
12	Organs of Locomotion	22	7	8	28
13	Cellular Tissue	6	—	1	5
14	Cutaneous System	16	6	5	8
	III. *Conditions, &c.*				
	Debility	460	136	172	388
	IV. *Poisons.*	—	—	1	—
	V. *Injuries.*				
1	Battle	—	—	—	—
2	Accidental	23	12	13	31
3	Homicidal	—	—	—	—
4	Self-inflicted	3	—	1	2
5	Judicial	—	—	—	—
	VI. *Surgical Operations.*	7	—	—	11
	No appreciable disease	—	—	—	—
	Cause unknown	—	—	—	—
	Total	1,507	498	578	1,214
	Ratio per 1,000 of Strength 1878	42·64	45·77	58·49	21·64
	Ratio per 1,000 of Strength 1868–77	41·97	47·22	38·31	15·56

When compared with the invaliding returns for last year, there is in Bengal a large increase in the rates for febrile affections and those for the constitutional group, the ear, the respiratory, digestive, and urinary systems, and for general debility are also higher, but affections of the nervous, circulatory, and cutaneous systems and diseases of the eye show a decrease. For the Madras Command the rates for the febrile and constitutional affections, for those of the nervous, respiratory, and digestive systems show a decrease, and those for diseases of the circulatory and cutaneous systems, and for general debility an increase, but the rates do not differ very materially for the two years, being on the whole fractionally lower. In the Bombay Command there is a large increase in the rates for febrile and constitutional affections, and higher rates are observed for all disabilities than in the preceding year, except for the organs of locomotion. *India.*

Section III.

Mean Daily Sick.

The average number of non-commissioned officers and men always ineffective from sickness in Bengal was 2302·66, in Madras 678·42, and in Bombay 637.

The usual information, calculated on these numbers, is given in the subjoined Table:—

	Bengal.		Madras.		Bombay.	
	1878.	1868–77.	1878.	1868–77.	1878.	1868–77.
Ratio per 1,000 constantly sick	65·14	56·09	62·35	57·15	64·46	53·40
	Days.	Days.	Days.	Days.	Days.	Days.
Average sick time to each soldier.	23·78	20·47	22·76	20·91	23·53	19·49
Average duration of each case of sickness.	14·87	14·17	17·03	17·13	13·03	14·05

Section IV.

On the Influence of Age on the Mortality.

The ages of the troops serving in India, arranged in quinquennial periods, and the deaths at each age, are shown in the following Table:—

	Under 20.		20 and under 25.		25 and under 30.		30 and under 35.		35 and under 40.		40 and upwards.	
	Average Strength.	Died.	Average Strength.	Died.	Average Strength.	Died.	Average Strength.	Died.	Average Strength.	Died.	Average Strength.	Died.
Bengal	1,022	6	11,991	252	11,503	239	5,222	108	3,380	79	881	57
Madras	244	3	2,634	44	3,396	79	1,734	44	1,304	30	405	33
Bombay	260	1	3,133	56	3,684	71	1,279	35	1,011	27	274	9
Total	1,526	10	17,758	352	18,583	389	8,235	187	5,695	136	1,560	99
Ratio of deaths per 1,000 of strength, 1878	6·55		19·82		20·93		22·71		23·88		63·46	
Ditto, 1868–77	8·17		14·89		17·46		25·34		31·55		53·24	

XIII.—ON THE HEALTH OF THE TROOPS ON BOARD SHIP.

STATISTICAL REPORT.

Troops on Board Ship.

The troops embarked during the year, as shown in the returns received in the Army Medical Department, were:—

I. Corps, and drafts for corps, proceeding on service abroad -	19,021
II. Corps returning from abroad - - - -	7,730
III. Corps or detachments, passing by sea from one Command to another (White troops) - - - - -	8,274
Corps or detachments, passing by sea from one Command to another (Black troops) - - - - -	22
IV. Invalids returning to England - - - -	3,049

1.—Troops Proceeding on Foreign Service.

During the year 19,021 non-commissioned officers and men, giving an annual average strength of 1,314, embarked for foreign service. In this force there were 691 admissions into hospital and 4 deaths; the admission rate, per 1,000 of the annual average strength, is therefore 525·9, or 125·0 higher than that for last year, and the death rate is 3·04, or 1·05 lower.

The classes and orders of diseases by which the admissions and deaths were caused are shown in the following Table:—

Troops on Board Ship.

Orders.	Diseases.	1878. Strength of N.C.O. and Men Embarked - - - 19,021		1878. Annual Ratio per 1,000 of the Strength.		1869–77. Annual Ratio per 1,000 of the Strength.	
		Average *Annual* Strength - 1,314					
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
	I.—*General Diseases.*						
1	Febrile Group - - -	45	1	34·2	·76	36·8	1·11
2	Constitutional Group - -	119	—	90·6	—	109·3	·55
	II.—*Local Diseases.*						
	Diseases of the—						
1	Nervous System - -	7	1	5·3	·76	5·2	·64
2	Eye - - - -	5	—	3·8	—	11·0	—
3	Ear - - - -	1	—	·8	—	·7	—
4	Nose - - - -	—	—	—	—	·1	—
5	Circulatory System - -	6	—	4·6	—	1·3	·18
6	Absorbent „ - -	12	—	9·1	—	6·2	—
8	Respiratory System - -	58	1	44·1	·76	37·4	1·57
9	Digestive „ - -	67	—	51·0	—	56·9	·28
10	Urinary „ - -	86	—	65·4	—	68·6	—
11	Generative „ - -	11	—	8·4	—	7·3	—
12	Organs of Locomotion - -	4	—	3·0	—	1·9	—
13	Cellular Tissue - -	24	—	18·3	—	17·0	·09
14	Cutaneous System - -	169	—	128·6	—	60·9	—
	III.—*Conditions, &c.*						
	Debility - - -	7	—	5·3	—	5·9	—
	IV.—*Poisons.*	1	—	·8	—	·4	·09
	V.—*Injuries.*						
2	Accidental - - -	67	—	51·0	—	42·5	·55
4	Self-inflicted - - -	—	1	—	·76	—	·09
5	Judicial - - -	1	—	·8	—	·3	—
	VI.—*Surgical Operations.*						
	No appreciable disease - -	1	—	·8	—	·3	—
	Total - -	691	4	525·9	3·04	470·0	5·15
	Average of 10 years, 1868–77 -	—	—	495·3	5·04	—	—

GENERAL DISEASES.—The admission rate for the *febrile group* is higher by 14·5 than last year's. Scarlet fever caused 11 of the admissions, 7 of these occurred on the "Teuton," and 4 on the "Dunrobin Castle," both ships embarked troops for the Cape in December. For enteric fever there were two admissions, one of which (supposed to have been contracted at Shoeburyness) proved fatal. Of simple continued fever there were 12 cases, of febricula 9, and of erysipelas 5. The admission rate for constitutional diseases is 10·8 lower than in 1877. Of the admissions 78 were for primary, and 8 for secondary syphilis, 27 for rheumatism in its various forms, and 2 for hæmoptysis.

LOCAL DISEASES.—The admission rate for *diseases of the nervous system* is double that for 1877; the death occurring in this group was from heat apoplexy. *Diseases of the eye* were less prevalent. Bronchitis (33 cases) and pneumonia (17 cases) were the principal causes of the higher admission rate for *diseases of the respiratory system*, the fatal case was from the latter disease. The admission rate for *diseases of the digestive system* is much higher than that of the preceding year, chiefly from a larger number, proportionately, of cases of tonsillitis (35). To 78 cases of gonorrhœa is due, principally, the

Troops on Board Ship.

increased rate of admissions for diseases of the urinary system. The cutaneous system gives an admission rate more than double that for 1877; of the admissions, 124 were for itch, and 21 for ulcers.

Poisons.—There was one admission for delirium tremens.

INJURIES.—*Accidental* injuries were, in proportion, much more frequent than in 1877, and admission rate is 20·9 per 1,000 of the strength higher. Contusions caused 15 of the admissions, sprains 13, and wounds 28.

Self-inflicted.—One man jumped overboard whilst delirious, and was drowned. He was at the time under treatment for simple continued fever.

II.—TROOPS RETURNING HOME FROM ABROAD.

The number of effective non-commissioned officers and men that embarked for England from stations abroad was 7,730, giving an annual average strength of 646. Among these there were 377 admissions into hospital, and 10 deaths, being in the ratios, respectively, of 583·5 and 15·48 per 1,000 of the average strength. The admission rate is 46·4, and the death rate 7·46 higher than last year's.

The admissions and deaths in the various classes, and orders of diseases are shown in the following Table:—

Orders.	Strength of N.C.O. and Men Embarked - - - / Average *Annual* Strength - — Diseases.	7,730 / 646 Admitted.	Died.	1878. Annual Ratio per 1,000 of the Strength. Admitted.	Died.	1869–77. Annual Ratio per 1,000 of the Strength. Admitted.	Died.
	I.—*General Diseases.*						
1	Febrile Group - -	123	1	190·4	1·55	119·7	1·89
2	Constitutional Group - -	67	—	103·7	—	73·9	·95
	II.—*Local Diseases.*						
	Diseases of the—						
1	Nervous System - -	5	1	7·7	1·55	6·5	1·26
2	Eye - - -	8	—	12·4	—	14·9	—
3	Ear - - - -	—	—	—	—	·6	—
5	Circulatory System - -	—	—	—	—	2·5	·95
6	Absorbent „ - -	15	—	23·2	—	11·4	—
7	Ductless Glands - -	—	—	—	—	·2	—
8	Respiratory System - -	30	1	46·4	1·55	43·1	2·68
9	Digestive „ - -	28	1	43·3	1·55	73·1	3·95
10	Urinary „ - -	40	—	61·9	—	31·8	·16
11	Generative „ - -	6	—	9·3	—	7·7	—
12	Organs of Locomotion -	1	—	1·6	—	2·4	—
13	Cellular Tissue - -	9	—	13·9	—	13·3	—
14	Cutaneous System - -	12	—	18·6	—	39·3	—
	III.—*Conditions, &c.*						
	Debility - - -	19	—	29·4	—	10·1	—
	IV.—*Poisons.*	1	—	1·6	—	2·8	·63
	V.—*Injuries.*						
2	Accidental - - -	13	6	20·1	9·28	38·4	·16
4	Self-inflicted - - -	—	—	—	—	—	·16
	VI.—*Surgical Operations.*	—	—	—	—	·2	—
	Total - -	377	10	583·5	15·48	491·9	12·79
	Average of 10 years, 1868–77 -	—	—	511·6	13·09	—	—

GENERAL DISEASES.—The admission rate for *febrile diseases* is higher by 96·0 per 1,000 of the strength than in 1877. Ague, the principal cause of the increased rate, furnished 104 of the admissions, all occurred in men coming home from India; the death was from remittent fever. *Constitutional diseases* give an admission rate higher by 6·3 per 1,000 men than last year's. Of 67 admissions in this class, 52 were for primary syphilis. *Troops on Board Ship.*

LOCAL DISEASES.—*Diseases of the nervous system* give an admission rate lower by one-half than in the previous year. There was one death from apoplexy. *Diseases of the eyes* were also less prevalent, while those of the *absorbent system* were, proportionately, more so. *Diseases of the respiratory system* furnished a lower admission rate by 8·8 per 1,000 men than in 1877. Bronchitis was the cause of 24 of the admissions, and pneumonia of the death. *Diseases of the digestive system* were much less prevalent, the admission rate being less than half that of the previous year. Dysentery furnished 8 of the admissions, diarrhœa and hepatitis each 7; the death was from the latter disease. *Diseases of the Urinary System.*—The admission rate is higher by 24·8 per 1,000 of the strength than last year's. Of the admissions 32 out of 40 were for gonorrhœa. Diseases of the cutaneous system furnish an admission rate lower by 11·5 than in 1877.

Debility.—The admissions occurred almost entirely in men returning from India. The rate is higher by 24 per 1,000 men than last year's.

INJURIES.—Accidents were much less frequent, but more fatal. The deaths were all from drowning, and were due to the foundering of H.M.S. "Eurydice," off the Isle of Wight, when returning from Bermuda.

III.—TROOPS PROCEEDING FROM ONE STATION ABROAD TO ANOTHER.

White Troops.

The number of non-commissioned officers and men proceeding from one station abroad to another was 8,274, giving an annual average of 247. In this force there were 515 admissions into hospital, and 4 deaths, being in the annual ratios, respectively, of 1879·6 and 14·60 per 1,000 of the average strength. The admission rate is higher by 1221·5 than that for last year, when there were no deaths.

Black Troops.

The number of black troops proceeding from one foreign station to another was 22. There were no cases of sickness among them.

Troops on Board Ship.

The classes and orders of the diseases to which the admissions were due are shown in the following Table :—

White Troops.

Strength Embarked - - - - -	8,274
Average *Annual* Strength - - - -	247

Order.	Diseases.	Admitted.	Died.	Ratio per 1,000 of Strength.	
				Admitted.	Died.
	I.—*General Diseases.*				
1	Febrile Group - -	327	2	1193·4	7·30
2	Constitutional Group -	24	—	87·6	—
	II.—*Local Diseases.*				
	Diseases of the—				
1	Nervous system - -	4	2	14·6	7·30
2	Eye - - -	6	—	21·9	—
5	Circulatory System -	1	—	3·7	—
8	Respiratory „ -	5	—	18·3	—
9	Digestive „ -	30	—	109·5	—
10	Urinary „ -	17	—	62·0	—
11	Generative „ -	7	—	25·6	—
13	Cellular Tissue - -	6	—	21·9	—
14	Cutaneous System - -	13	—	47·4	—
	III.—*Conditions.*				
	Debility - - -	43	—	156·9	—
	IV.—*Poisons.*	1	—	3·7	—
	V.—*Injuries.*				
2	Accidental - - -	31	—	113·1	—
	Total - -	515	4	1879·6	14·60

White Troops.

General Diseases.—*Febrile Group.*—Compared with last year there is a large increase in the admission rate for this group, of 654·5 per 1,000 of the strength. This is due to the large number of cases of paroxysmal fevers occurring in the troops proceeding from Cyprus to India, Malta, Gibraltar, and Halifax, (Nova Scotia). Ague furnished 171 of the admissions, and remittent fever 137. Half of the former, and three-fourths of the latter, occurred in the 101st Regiment during the voyage from Cyprus to Halifax. Cholera is answerable for seven admissions and two deaths; four of the former, and one of the latter, occurred on board the transport "Clydesdale," and the remainder of the admissions and the other death on board the "Maravel": both ships were employed in the conveyance of Royal Artillery from India to Malta.

Constitutional Group.—The admission rate for this group is in excess of that for 1877 by 31·4 per 1,000 of the strength. Primary syphilis supplied 13 out of 24 admissions, and 7 of these occurred among troops proceeding from Singapore to Hong Kong.

Local Diseases.—When compared with last year, the admission rates for diseases of the nervous and generative systems are higher, while those for all the other groups are lower. The two deaths were from apoplexy.

Debility.—The high admission rate for debility is due to the condition chiefly, of the 101st Regiment on leaving Cyprus; 33 of the admissions occurred during the voyage to Halifax. *Troops on Board Ship.*

IV.—Invalids Returning to England.

The number of invalids embarked for England was 3,049. There were 29 deaths among them while at sea; these are accounted for, as in former years, in the tables showing the sickness and mortality of the commands from which they were invalided.

HOME STATIONS.

SANITARY REPORT.

United Kingdom.

Aldershot.

Surgeon-General J. McGrigor Grant remarks:—

"The following comparative table is the best illustration regarding the health of the troops in this division.

"The average strength has been 13,775, the total admissions 10,356, and the number of deaths 71.

"The ratio per 1,000 for 1877–78, is as follows:—

——	1877.	1878.
Admissions	746·0	751·7
Deaths	4·7	5·2
Daily per-centage of sick to strength	4·5	4·5
Invalids	49·8	49·3

"*Accommodation.*—The average number of men in each barrack-room has been 23, and the cubic space 582 feet, and superficial area 48 feet per man. The average number of men in each hut has been 16, giving a cubic space and superficial area to each man of 365 and 47 feet respectively. There has been no overcrowding except in a few instances, and then only for a few days, caused by the calling up of the Army and Militia Reserves when the weather did not admit of camping out.

"From the preceding table it will be seen that though the year 1877 is slightly better than that under review, it is not so to any appreciable extent: it must be admitted that the past year has been an exceptional one in many respects, particularly the calling out of the Reserves and the very hot weather in which the manœuvres took place.

"Regarding the venereal affections, the limited area of the Camp in which the Contagious Diseases Act is in force in some measure neutralises the good arising from its operation; it is an admitted fact, that not only is the character of primary syphilis much milder in type, but is much diminished. The number admitted into the third station hospital within the year has been almost equalled by the admissions for that disease in a single regiment some few years ago.

"Aldershot continues to maintain its character for salubrity; the conservancy arrangements in the Camp are strictly enforced, and everything is done to ensure the health and well-being of the troops.

"There was an epidemic of measles among the families in the permanent barracks and huts in the North Camp.

"Among the non-commissioned officers and men the smallness of the number admitted for zymotic or preventable diseases attests the attention to sanitation in all the corps and departments.

"The hospitals have been strictly under the station hospital system, and looking at the number of men who have passed through them during the year—many suffering from very serious disorders—and who have returned to duty, speaks to the excellence of the system."

Eastern District.

Deputy Surgeon-General W. A. Mackinnon, C.B., reports that "the health of the troops serving in the Eastern District during the past year has been good; small-pox prevailed at Harwich among the civil population up to the end of March, but no cases occurred among the troops stationed there; three cases of small-pox occurring in the West Sussex Militia at Chelmsford were

admitted into the station hospital at Warley, one of which was fatal. The prevailing diseases have been syphilis and pulmonary; respecting the former, I would note the difference which has existed in the prevalence of the primary form of syphilis between Colchester, a protected station, where the proportion of admissions per 1,000 of strength has been 18·48, and Norwich and Warley, non-protected stations, where the ratio has been 73·10 and 134·34 respectively. *United Kingdom.*

"The following sanitary defects were noted at Deputy Surgeon-General Murray's half-yearly inspection :—

"*Colchester.*—Prisoners' room in cavalry barracks too small for usual number of occupants. Schoolrooms, both in cavalry and artillery barracks, too small for the number of pupils. No bathrooms in artillery barracks. Steps have been taken to remedy all these defects.

"*Norwich.*—The guardroom was reported too small, but steps have been taken to enlarge it.

"*Yarmouth.*—The position of the barracks is stated to be faulty, and liable on the occasions of high tides and north-west gales of wind to be flooded; this condition is irremediable. New barracks have been sanctioned.

"The sanitary improvements which have been effected during the year were :—

"*Landguard Fort.*—The drainage from the hut barracks, which includes that from the new fort, has been added to and improved.

"*Warley.*—New range of ablution basins.

"*Norwich.*—Two additional boilers have been supplied for cooking vegetables.

"The condition of the vicinities of camps, barracks, and hospitals in the district, with the exception of Yarmouth, is reported to be good in regard to drainage.

"The effects of gymnastic training on the health of the troops is reported favourably of; during the year 12 officers and 879 recruits underwent a course."

South-eastern District.

Deputy Surgeon-General J. E. Moffatt remarks that "the health of the troops in the South-eastern District during the year 1878 has been satisfactory. The ratio per 1,000 admitted to hospital has been 704·63, deaths 5·47, and invalided 43·26, making a total loss to the service by disease of 48·73 per 1,000. The average daily sick has been 337·83.

"No case of small-pox occurred during the year, and only six cases of measles, two of scarlet fever, and one of enteric fever, showing a great immunity from infectious febrile diseases.

"*Dover.*—The following sanitary improvements have been effected in the military prison; the waste pipes from the sinks were disconnected from the drains; the waterclosets reseated, and a cistern (100 gallons) put up for supply of latrines and urinals.

"*South Front Barracks.*—A similar service for latrines and urinals, with a cistern of 1,200 gallons and a 600-gallon cistern for the latrines attached to the married soldiers' quarters. In all these cases the supply pipes have been disconnected from the ordinary service pipes.

"*Dover Castle.*—The latrine in the keepyard has been enlarged by two seats for men and four for women; a second doorway has been made in the mens' latrine, which improves the ventilation. A cooking stove has been supplied to the recreation room. Two married soldiers' quarters and a meat store have been completed in the yard adjoining Archcliffe Fort.

"*Shorncliffe.*—Complaints are made, as usual, by medical officers of the dilapidated state of the huts in the North and South Camps. New Artillery barracks to accommodate 138 non-commissioned officers and men, and a small lavatory for the Army Service Corps, have been handed over for occupation during the year.

"*Brighton.*—The reconstruction of the south block of troop rooms from the central corridor system has been completed; 11 troop rooms, a sergeants' mess, a recreation room, a fencing room, and a library being the result. In rear of this block an additional latrine, a new cookhouse, and a lavatory have been

United Kingdom.

built. The north block, on a similar plan, will, it is hoped, be reconstructed this year.

"*Maidstone.*—The sum of 300*l.* has been set apart for the repair of the station hospital, and to place the building in a secure condition.

"The sanitary condition of the other stations in the district is satisfactory, and does not call for particular comment."

Chatham District.

Deputy Surgeon-General E. B. Tuson reports that "the general health of the troops has been very good, notwithstanding that a large number of admissions into hospital has been observable; these have been in most cases from trivial affections, and the numbers due to the exceptional conditions of the garrisons during a great part of the year from the influx of the Reserves; no ill effects from the increased number in the barracks were, however, observed.

"The presence of scarlet fever in 17 cases, and, in fact, to the persistent occurrence for some time of cases of this disease at Chatham, may well give rise to the strong suspicion of some lurking mischief among the underground drainage, old cesspits, &c. of such old barracks and buildings.

"The guardroom at St. Mary's Barracks and the lock-up attached to that in Chatham Barracks are too small for satisfactory sanitary conditions at times. The officers' quarters in Chatham Barracks are small, ill-ventilated, and unsatisfactory, and the offensive emanations from the drainage about them has been of serious importance and is now under investigation by the Royal Engineer Department. The hospital at Gravesend is very indifferent and badly situated: the erection of a more appropriate one in the Milton Barracks would be of great advantage. The cooking apparatus in the station hospital at Chatham having been found practically unsatisfactory has been represented.

"Some medical officers have expressed their opinion that the quantity of the meat ration is insufficient, but I am not aware of the existence of any substantial grounds for their opinion, especially as facility is afforded for the soldiers supplementing the supply by purchase at cheap rates.

"The water supply has been improved at some barracks and is now good and satisfactory.

"The underclothing of the men in the cold weather has been considered insufficient by the officer in medical charge of the Royal Engineers and 30th Regiment, and I coincide with his opinion that flannel shirts should be worn in substitution for cotton ones; as the kersey is generally worn, it, with a cotton shirt, constitutes very inadequate and improper clothing during inclement weather.

"The drainage in some localities in the district has been under repair, but I think the condition of most of it at present is tolerable, and where defective, is being remedied.

"The conservancy of the different barracks has been well attended to.

"The following sanitary improvements have been carried out in the district during the year.

"*Sheerness.*—Ventilation to officers' billiard room. Conversion of servants closets into Goux latrines. Rectification of drainage of officers' quarters. Providing operating table to mortuary. Providing cast-iron ash-bins generally.

"*Chatham Barracks.*—Improvements to main drainage. Ventilating soil pipes of waterclosets.

"*Brompton Barracks.*—Improving and ventilating officers' mess. Removing old drain from rear of officers' quarters. Providing earthclosets to several married soldiers' quarters. Improving and ventilating barrack rooms. Providing cisterns and separate water supply to a large number of latrines and urinals.

"*Commissariat Depôt.*—Ventilating drains. Providing cisterns and separate water supply to urinals.

"*Fort Amherst House.*—Converting privy to watercloset.

"*Fort Clarence.*—Filling up cesspit and substituting watercloset. Providing cisterns and separate water supply to warders' watercloset.

"*Garrison Buildings.*—Providing cisterns and separate water supply. Providing an earthcloset at office keeper's quarters. Improving latrine accommodation at Garrison Chapel. *United Kingdom.*

"*St. Mary's Barracks.*—Laying on water to closets and officers' mess. Providing cisterns and separate water supply to a number of latrines and urinals.

"*Upnor Barracks.*—Providing separate cistern for water at ordnance store.

"*Station Hospital (Fort Pitt).*—Providing cisterns and separate water supply to officers' quarters, casemates, office, and auxiliary hospital.

"A number of improvements are proposed and estimated for during the year 1879."

Woolwich.

Deputy Surgeon-General J. Small reports that "the embodiment of the Reserves has rendered the past year a rather exceptional one, and an increase of sickness might have been anticipated from the sudden assemblage of so many men from different parts of the country; still the general health of the troops in the district has been good, and although there has been an increase of venereal affections at Woolwich compared with 1877, the total amount of sickness to strength has but slightly exceeded 3·5 per cent. Taking into consideration the number of men recently returned from foreign service and the number of very young soldiers quartered at Woolwich, the amount of sickness may be pronounced small.

"Among the admissions to hospital there were 26 for enteric fever, 11 at Woolwich, and 15 at Shoeburyness. At the first-named station no satisfactory cause could be traced, but at Shoeburyness the bursting of a drainpipe was thought to be the source; the cases generally were mild, as but three deaths occurred at both stations.

"The station hospital system has been in operation and continues to work most satisfactorily.

"During the past year a recommendation was forwarded that one of the wards in the Herbert Hospital should be heated with hot water pipes and be fitted with double windows; the latter part of the recommendation has been carried into effect, and the ward which it was proposed to set apart for pulmonary cases rendered somewhat warmer.

"The sanitary condition of the barracks, hospitals, and officers' quarters, together with the quarters occupied by married families, has been generally good; some few defects with regard to drainage and water supply have come under notice, and have either been remedied or are in course of rectification.

"The sickness among the officers, women, and children has been small.

"Authority has been obtained to set apart three small wards in the Herbert Hospital at Woolwich for the accommodation of sick officers; the necessary alteration has been made, and the equipment will shortly be completed.

"The staff of nurses have performed their duties very satisfactorily and to the advantage of the more serious cases; they are only employed at the Herbert Hospital, Woolwich.

"The following are the sanitary services performed at Woolwich during the year by the Royal Engineer Department:—

"Foul air extracting shafts to west rear range of Artillery Barracks.

"Areas formed round the basements of the field officers' quarters on the common.

"Cambridge Barracks, Staff sergeants' quarters. Latrines remodelled to obtain better flushing.

"Separate cisterns supplied for drinking and flushing water; waste pipes from cisterns and sinks brought into the open air."

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Southern District.

Surgeon-General T. Best reports:—"During the period embraced in this return the general health of the troops in the district has been remarkably good, more especially at Parkhurst, where there appears to have been scarcely any complaint of a really serious nature, and no mortality, the latter being altogether exceptional as compared with any previous year; the medical officer in charge is of opinion that careful filtration of the water used for drinking and cooking purposes has contributed in no small degree to the excellent health enjoyed by the military community at this station.

"As far as can be ascertained, no special local causes of an insanitary nature affecting the health of the troops exist, a remark that also applies to the few cases of enteric fever, nine (including one woman), that occurred at Portsmouth, Gosport, Winchester, Dorchester, and Devizes.

"The average strength of the force in 1878 was 9,130, the number of admissions into hospital 7,518, or a ratio of 823·43 per thousand of strength, and the number of deaths in hospital 61, out of hospital 10, total 71, or 7·77 per 1,000 of strength.

"The above figures compare favourably with those of 1877, when with an average strength of 7,320 there were 6,119 admissions, or a ratio of 835·93 per strength, and a mortality of 53 in, and 13 out of hospital, or 9·01 per 1,000 of strength.

"The barrack and hospital accommodation throughout the district has been sufficient, with the exception of a little unavoidable overcrowding during the mobilization of the Army and Militia Reserves; their sanitary condition has also been well attended to, and any improvements bearing upon the health of the troops have as far as practicable been efficiently carried out, the only exception being at Gosport, where the sewage of part of the town is drained into Haslar Creek, and a most offensive smell is given off at low tide when the mouth of the sewer is uncovered; in the summer with a southerly wind this is very perceptible along the line of barracks and as far as Priddy's Hard: this nuisance might be avoided if the sewer was carried more into the centre of the creek.

"The accommodation at Winchester has been considerably improved by the erection of a block for 28 married soldiers' quarters, also by the addition of a prisoners' room to the main guard, and at the hospital a separate ward for contagious diseases.

"The means of ablution at the different stations have been satisfactory, and, when practicable, bathing parades have been carried out during the summer season.

"Since May (1878) a ration of biscuit and preserved meat has been issued once a week in lieu of the ordinary ration, otherwise there has not been any alteration in the scale of soldiers' diet, and the ration of bread and meat has invariably been of good quality. As regards the sufficiency of the meat ration, it is the general opinion of medical officers that an extra quarter of a pound might be advantageously issued.

"The water supply has been good and abundant, but requires filtration at Christchurch and Parkhurst when used for drinking and cooking purposes, and at the latter station the medical officer reports a deficiency of water at certain periods of the year, the scarcity, however, being in his opinion attributable not to a want of supply, but to a great deficiency as regards pumping arrangements.

"With few exceptions, most favourable accounts can be given of the beneficial effects of the well-conducted courses of training at the gymnasia in the district, viz., Portsmouth, Gosport, Winchester, and Parkhurst, improvement in physique and muscular development having been as a rule recognised; unavoidable accidents have occurred, but of a mild nature.

"The Contagious Diseases Act is in operation at Portsmouth, Gosport, Hilsea, and Winchester, and as to its efficiency, it is satisfactory to know that, compared with the previous year, there has been less venereal disease.

Netley.

United Kingdom.

Surgeon-General H. H. Massy, M.D., C.B., forwards the following abstract derived from the Registrar's Annual Return :—

TABLE I.—INVALIDS.

—	Remained 1st January 1878.	Since Admitted.	Died.	Discharged			Remained 31st December 1878.
				Invalided.	Duty with Corps.	To Lunatic Hospital.	
From Foreign Stations.	91	2,935	30	1,605	1,284	—	107
From Home Stations.	—	—	—	—	—	—	—
Men sent for change.	—	12	1	5	2	—	4

TABLE II.

Showing the number of invalids treated, died, discharged to duty, and discharged the service 1876–78 :—

Year.	Remained from previous Year.	Admitted during Year.	Total treated.	Died.	Ratio per 1,000.	To duty with Corps.	Ratio per 1,000.	Discharged the Service.	Ratio per 1,000.
1876 -	127	2,472	2,599	38	14·62	1,125	43·28	1,377	530·0
1877 -	56	2,527	2,583	61	24·13	1,249	48·38	1,131	457·6
1878 -	91	2,935	3,026	30	9·91	1,284	42·43	1,605	530·4

TABLE III.—EFFECTIVES.

Corps.	Average Annual Strength.	Remained in Hospital 1st January 1878.	Since Admitted.	Died.	To Duty.	Invalided.	Remained in Hospital 31st December 1878.
Army Hospital Corps -	151·00	4	110	1	98	9	6
Army Service Corps -	26·00	1	8	—	8	—	1
Staff and details - -	20·26	1	6	1	5	—	1
Discharge Depôt* - -	127·70	69	344†	7	336	9	61

"From these tables it will be seen that the admissions for 1878 have been considerably in excess of those for the two previous years. This is owing, in a large degree, to the increase of the force at the Cape and in the Mediterranean. There has been but little alteration in the proportion of men discharged to duty and from the service during 1878 in comparison with the two previous years, but the death ratio for 1878 has been relatively very much smaller, being 9·914 in the latter, while it was 14·62 and 24·139 in 1876 and 1877 respectively.

"*Army Hospital Corps.*—The strength of the corps at this station has been considerably under the establishment; this was unavoidable, and during the summer was made up, and indeed the strength exceeded, by men from the Reserve which were called out during the period. These Reserve men were very useful in numerous occupations about the hospital, though of course in actual ward work were very inferior to trained orderlies of the Army Hospital Corps.

* Joined during the year, 3,314. † Including 99 transfers from board ships.

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"*Water Supply.*—There has been no change for years. The supply is derived from artesian wells and a reservoir. The quality has been good and the quantity sufficient.

"*Drainage.*—In fairly good order. Drains and pipes have occasionally been out of order, but the defects have always been remedied without delay.

"I recommended in last year's report that a women's hospital be built at this establishment, which would enable the building at present used, though but badly suited for that purpose, to be employed as an infectious hospital.

"It has again occurred that infectious cases amongst women and children were admitted into the Royal Victoria Hospital, a makeshift arrangement which is in many respects very objectionable, besides being liable to spread infectious diseases."

Western District.

Deputy Surgeon-General J. Lamprey reports that—

"The health of the troops in the district during the year has been good. Although considerable overcrowding of barracks occurred during a portion of the year, in consequence of the Reserves being called out, there was no increase of sickness beyond a fair ratio for strength.

"The general sanitary condition of barracks was satisfactory, with the exception of some minor defects which were attended to, viz., at Brecon the latrines and urinals and system of drainage were put in a satisfactory state. At Horfield new drains were laid down, and at Penally the defects of the water supply system were made good.

"The Militia camping ground at Worcester, in part of the enclosure of Norton Barracks, appeared to be very objectionable, owing to defective drainage of the ground and to the existence of two sewage intercepting tanks in connexion with the barrack drainage. It appears that there is great difficulty, owing to the great cost it would entail, in making a thorough and efficient sewage drain in connexion with this barrack, and hence the contrivance adopted of forming intercepting tanks; but another difficulty presents itself, as to how the interrupted sewage is to be disposed of. The Engineer Department is at present engaged in experimenting on the best means of preventing or removing any nuisance from the tanks. Another sanitary defect noticed was the close proximity of the field latrine to the ground when occupied by tents. This was remedied by removing the latrine to a portion of a neighbouring field outside the boundary of the barrack enclosure.

"The camping ground at Avonmouth, used by the troops undergoing a course of rifle practice, is objectionable in a sanitary point of view, the ground being very low, and water lying but a few feet from the surface. There are swampy ditches and tanks in its immediate vicinity, but no higher ground appears to be available in that locality.

"There are two gymnasia in the district, one at Pembroke Dock and the other at this station. The men who have undergone a course of instruction in both these places have shown a marked improvement in their physical condition and general health."

Northern District.

Surgeon-General D. R. Mackinnon reports that "the general sanitary condition of the stations in the Northern District has been fair. Several of the barracks and hospitals are objectionable from original faulty construction and length of occupation; various improvements, however, have been submitted to the authorities during the past year, and the most urgent requirements carried out, but still there are others that can be attained only by reconstruction and change of site.

"The cases of enteric fever, with one exception, occurred in old barracks. At Coventry an officer was taken ill in the mess block; the fever was traced to sewer gas in the room. Communication was immediately cut off between the rainpipe and the sewer, and the barrack drains rectified.

"A gunner of the Royal Artillery at Newcastle-upon-Tyne succumbed to the disease. The drainage was faulty, more especially in the vicinity of the field officers' quarters, and annoyance was caused by an old cesspit latrine at the back of the canteen; both defects have been remedied. Two cases at Preston recovered. The latrines were somewhat in fault, but are now more carefully supervised. For three cases in the North Fort at Liverpool no local causes have been assigned, but under the Parade are two large rain-water reservoirs into which sewage is believed to have gained admission. The pump handles for raising the water were removed by the advice of the medical officer, and application has since been made to have the tanks filled in, the water being dangerous. The only case from a new barrack was that of a man who spent a good deal of his time in a low part of the town of Halifax, where it is presumed he contracted the seeds of the disease, there being no insanitary conditions in the barracks or the vicinity. *United Kingdom.*

"The health of the married families was interrupted by the appearance of scarlatina, measles, and whooping cough amongst the children.

"The sleeping accommodation is somewhat too limited, and more especially where there is but one room for all domestic purposes.

"On the mobilization of the Army and Militia Reserves during April and May some overcrowding was unavoidable, but when the weather became more settled, tents were pitched and the defect remedied. The regulation cubic space and superficial area have been generally maintained.

"New brigade depôts have been opened at Richmond, Beverley, and Warrington. The improved sanitation and better accommodation will no doubt add to the comfort and diminish sickness amongst the men, but there is a want of a recruits' receiving room, the men, frequently suffering from parasitic diseases, require isolation for a time. There is a deficiency of out-door games at most of the stations."

North British District.

Deputy Surgeon-General J. S. Furlong reports that "the health and general sanitary condition of the district during the year 1878 has been good. There has not been any epidemic disease amongst the troops. Measles prevailed among the children at Hamilton, where the married soldiers' quarters are new and on the best sanitary principles, but no deaths occurred. At Stirling there was an outbreak of scarlet fever in the families living in barrack rooms in the castle, but by careful supervision of sanitary precautions the disease did not spread.

"Though the calling out of the reserves, and the consequent very overcrowded state of all the barracks, caused much anxiety to the medical officers, lest outbreaks of typhus or other diseases, caused by the above conditions, might arise, happily there was not any appreciable increase of disease; the test was a trying, but a very satisfactory one, of the general sanitary condition of barracks and hospitals.

"*Edinburgh.*—The castle barracks are in a very fair sanitary condition, but a bathroom on the improved principle, giving more accommodation, is much required for the upper barracks.

"The hospital has been entirely handed over to the Medical Department, the barrack hospital stores being removed to another building, the sergeants' quarters enlarged, and a soiled linen store obtained outside.

"*Leith Fort.*—The new married quarters in Leith Fort answer very well, but are rather few in number for a depôt battery. The prisoners' room has been enlarged and better ventilated. The medical officer considers that 12 gallons of water per diem for each adult at home is too small, in which I quite agree, as conservancy cannot be properly carried out with such a supply. The main sewer leading towards the sea is of very old construction, and requires to be overhauled and ventilated.

"*Glencorse.*—The old sewer leading from the Douglas Barrack is in an insanitary state, the latrines open directly into it, and the smell all around is very heavy and disagreeable. The remodelled reading-room is placed close to the latrines; a special report has been made on this subject, and full plans drawn by the Royal Engineer Department for abating the nuisance, but funds

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are wanted. The night urinals in the new barracks act well. The new hospital is very good so far as it is constructed, but an infectious ward is required, and a garden and fence to be made around the hospital.

"*Blackness Castle.*—I strongly recommended that the pipes conveying the sewage should be extended down to low water mark.

"*Aberdeen.*—Typhus fever was prevalent in the town when the "Reserves" were out, but although there were 14 men in each room constructed for only eight, no illness attributable to overcrowding occurred. An additional latrine has been constructed; it was very much required. The ablution rooms are gloomy, and could be easily improved to the great comfort of the men. The sergeants' mess is badly placed in a small room with a most inconvenient access.

"*Fort George.*—The water at Fort George has at length been remedied by filtration through spongy iron filters. The analyses after filtration were very favourable, and all complaints, so loud before, have ceased. Filtered water is required to be laid on to the hospital; at present it has to be sent for. The filters having frozen during the severe weather, it was necessary to draw water for drinking purposes in carts from Campbeltown. A new latrine, much wanted, has been built. A new mortuary is required to be built, and the present unfitted one made the soiled linen store, which is now in the attics of the hospital. A covered way is also wanted from the hospital to the ablution room and the latrines. The ablution rooms in the barracks are dismal and badly ventilated and lighted.

"*Perth.*—The west wing of the remodelled barracks was opened on the 10th April 1878. The plan of the married quarters is very good, but the work has been badly executed; many chimneys smoke, and the woodwork of windows and doors being of new timber, shrunk much. The wood floors of the new lavatories have been removed, and concrete laid down—a great improvement.

"*Stirling.*—The new married quarters of three rooms each have been occupied; they are 30 in number, and are situated on the north-east slope of the castle hill, to the west of, and a little below, the hospital.

"*Ayr.*—In Ayr Barracks a bathroom has been constructed, behind the guardroom, for recruits: it was much wanted.

"The hospital is old and requires more store rooms, and an orderlies' room; also a provision store, soiled linen store, and a mortuary: all but the soiled linen store are included in estimate for 1879.

"*Maryhill Barracks.*—These, the newest and most important barracks in the district, have been fully occupied since the spring. Surgeon Donaldson considers that the latrine accommodation in the hospital is too limited, viz. one closet for each ward of 13 beds, while outside there is but one small closet for orderlies, &c.: it would certainly be an improvement to increase the outside accommodation, which could then be used by convalescents. The hospital is quite open to the country, a fence is urgently required, and the grounds around to be laid out as a garden.

"Though the site of the barracks is well raised, and the fall for drainage good, from a sanitary point of view it is not satisfactory. The Possie Burn, which in the dry season is merely an open sewer, skirts the barracks, the smell from it is frequently abominable; besides, there are zinc smelting works which give off fumes of arsenic and sulphur within 200 yards; there are also paper, brick, and other works close around. Surgeon-Major Keith reports that the district is not considered a healthy one, and that typhus, typhoid, and scarlet fevers are not uncommon. It is a noticeable fact that in the three last outbreaks of cholera in the West of Scotland, the first case occurred at Maryhill, and in the same house.

"The various sanitary defects in the district have been brought to the notice of the authorities.

"The rations have been good; at some stations preserved meat has been issued lately once a week in lieu of fresh meat, and half a pound of biscuits twice a week in lieu of bread.

"There is no regular gymnasium in the district; one is, however, being built at Maryhill.

"The water supply in the district is now good."

Dublin District.

United Kingdom.

Deputy Surgeon-General J. L. Holloway observes "the sanitary condition of the barracks and hospitals of the Dublin District is very satisfactory; nor am I aware of any causes either from my own observation or from the reports of medical officers serving in the district calculated to prejudice the health of the troops, except the vicinities of some of the barracks of this garrison, and possibly at Longford, which are beyond military control.

"An item has been introduced into this year's estimates (1879) for carrying out the dry-earth system in the latrines at Richmond Barracks, but it will probably have to give way to the more costly and more important one of hospital extension at the Royal Infirmary. The sick rate of these barracks will show that the health of the troops has not suffered in consequence, and that the present defective system of drainage, though productive of annoyance and discomfort, has not originated disease.

"Among the chief sanitary services completed during the past year are:—

"*Dublin.*—At Arbour Hill station hospital, where the water supply had become defective from occlusion of the old iron pipes by rust, a new system of pipes has been laid, and the supply restored. An apparatus for heating water for baths at the Royal Infirmary has been completed. The drainage of Island Bridge Barracks has been greatly improved by the substitution of a 12-inch stoneware tube for the old square drain. The canteen at these barracks has been greatly enlarged by including, by means of an archway, an adjoining room, thus adding greatly to the comfort and health of the occupants, who previously were densely crowded together. The supply of Vartry water to Richmond Barracks has been increased by the addition of extra taps. This water has also been laid on to the cells of these barracks. At Ship Street Barracks the ventilation of some of the blocks has been improved, and the same has been carried out at the garrison cells, Arbour Hill. The surface drainage at the Royal Barracks has also been improved. The drainage round the huts at Beggars' Bush Barracks has been improved by giving a better fall to it, as has been done to the surface of the ground conducting to these drains. One or two suspicious febrile attacks occurring in the family of the officer commanding the Magazine Fort, the latrines and waterclosets were overhauled, and the soil pipes ventilated.

"*Curragh Camp.*—At this camp, now a part of the Dublin District, several important sanitary improvements have been effected during the year; among the principal are the following; about two-thirds of the cesspits in and about the Camp have been filled in, and drains connected with the main sewer leading to the sewage farm, this service is being actively continued. A drain is being laid to connect the drainage of No. 1 station hospital (Hare Park) and Artillery Square with the main sewer. Dry-earth stoves are being built to dry and store the earth for the privies. Cast-iron ash-bins have been distributed over the Camp, and additional trapped gratings for slops provided where necessary. About half a dozen officers' quarters have been provided with Moule's apparatus.

"*Newbridge.*—The water tank has been cleaned out, the bottom levelled with concrete cement, and the whole covered in; the drainage of the station hospital has been rectified.

"*Athlone.*—The conversion of cesspit privies (officers') into latrines, and addition of ablution and bath room to the provost establishment.

"*Gort.*—At this station, where the absence of good water at certain seasons of the year has been complained of, an underground tank capable of containing 10,000 gallons of rain water has been completed. The provisions for carrying out the dry earth-system of conservancy has been enlarged by the construction of a stove and drying room.

"*Longford.*—The drainage of the ablution rooms and wash-house has been improved.

"*Naas.*—The water supply has been laid on to the new hospital (opened last year), and a new well is in course of construction.

"*Castlebar.*—Stoves for drying earth for the latrines have been provided in both artillery and infantry barracks. The provost cells have been improved.

"*Birr.*—A service has been proposed in this year's estimates for converting the latrines to the dry-earth system.

United Kingdom.

"The rations during the year have been generally good. With regard to the meat ration, though its smallness has repeatedly been commented on by other authorities, I would specially draw attention to this subject. Constituted as our army now is of young growing lads, every tissue of whose bodies is seizing on formative material, the demand for which is further increased by the wear and tear caused by incessant drill and parade, I have come to the conclusion, after constant inquiries, that the average amount of cooked meat which a soldier gets a day is about five and a half to six ounces. The allowance of uncooked meat is, as is well known, twelve ounces, but one-third must be deducted from this for bone, thus reducing the uncooked meat to half a pound; when this is cooked it is reduced to an amount varying with the quality of the meat. At out-stations, where this is frequently poor, it is common for it not to reach five ounces. With the truly excellent meat of this garrison it is generally six ounces, or rather over, but rarely, if ever, reaches seven ounces. Should, however, many members of the mess be 'on duty,' the amount remaining for those 'off duty' is very small, as it is customary with soldiers to make out a large dinner for the comrade on guard. This amount (six or seven ounces) is about what a full grown man of easy circumstances would consume at any one of his two or three meat meals. It is certainly too little to supply the element of growth and waste of tissue of a young recruit. It will be said that the soldier should out of his 8½*d.* clear pay per diem supply any want in this direction, and so he does as a rule at the refreshment bar attached to regimental recreation rooms, but not much can be added in the way of meat at present prices. Viewing the present composition of the army it would have been better, at least from a physiological point of view, to have increased the meat ration at the expense of the cash balance.

"The clothing remains as before, and is good and suitable, with the exception of the serge frock. I would beg to call especial attention to the quality of the material of which this article is made, as I believe it contributes, as much as anything else, to fill the hospitals. It has the undesirable quality of being cold in winter and hot in summer. Owing, no doubt, to its loose shoddy-like texture a March wind blows through it as through a colander. Some old soldiers line it, but the younger ones, who require this most, neglect to do so, and to inquiries, the majority say that the article so soon becomes frayed, dirty, and untidy that it is not worth it. No doubt the loose cut of the frock is a great advantage in many duties, and if made of better material or of cloth like the tunics would be an excellent article. Possibly this might be done without any additional expense by giving the tunic every third year instead of biennially as at present. I think on a reference to regimental military authorities it will be found that since the tunic is rarely worn, except on Sundays, at the end of the second year's wear it is as good as new. As the tunic costs 14*s.* and the serge 10*s.* 5*d.*, the difference saved in this way would meet the cost of a better material."

Belfast District.

Surgeon-Major M. L. White, the officiating Principal Medical Officer, remarks that "the sanitary reports from the different stations in the Belfast District for the year under review are for the most part satisfactory, inasmuch as no sickness is directly attributable to any existing insanitary conditions. All refer to the overcrowding in barracks, which was unavoidable during the mobilization of the Reserves last summer; but owing to the favourable season and to the excellent arrangements made as to ventilation, &c., no ill effects were observed. The Belfast Command has enjoyed a singular immunity from epidemic diseases during the year. The only cases of enteric fever are reported from Belfast, but they are not supposed to have been caused by any defects in the sanitary condition of barracks or to be in any way due to the substitution of water for drinking purposes from the town reservoir for that from the Cromac springs; this change was made in October last. The means of ventilation, warming, and lighting of barracks, the quality of clothing and bedding and the ration supplies, are all favourably reported on.

"The following improvements in barracks, &c. are noted in the annual reports :— *United Kingdom.*

"*Armagh.*—Several new drains have been laid down. A new latrine has been erected, and the new block for canteen and recreation room is almost finished.

"*Belfast.*—A new block of quarters for married people has been opened.

"*Dundalk.*—A new pack store for the station hospital.

"*Londonderry.*—Considerable progress has been made with the new quarters for married men; they will be available for occupation in a few weeks.

"*Omagh.*—New barracks for the 64th Brigade Depôt are nearly ready for occupation.

"The only gymnasium in the Command is at Belfast, and here all recruits on joining are put through a course of instruction with most favourable results, as evidenced by increased muscular development and improved physical condition."

Cork District.

Deputy Surgeon-General G. Thompson remarks that "the reports received from the medical officers in charge in the several stations in the Cork district, of the general health of the troops, and the sanitary condition of barracks during the year 1878, are very satisfactory, and they accord with my observations at the periodical inspections.

"Measles prevailed in several stations more or less, but on the whole it was of a very mild character, though it did not cease until it had attacked almost every child liable to it.

"Scarlet fever also prevailed in several stations; in Buttevant it amounted to the proportions of a rather severe epidemic, lasting for months and requiring the most strict regulations and precautions to keep it in bounds. There was a suspicion that the drains were in fault, but this is problematical; more likely it was imported by the militia, who were encamped in the barrack square during the summer for the annual training; the drains were examined and every conceivable defect remedied.

"Only four cases of enteric fever occurred, which is a great improvement on the previous year, particularly when taken into consideration with the large numbers of the Reserves and militia located in the several barracks, and who, from previous associations and mode of life, might naturally be expected to have introduced some taint of this formidable disease. In no instance could the fever be attributed to any sanitary defect.

"It is to be regretted that venereal disease should have increased in the 'protected' district over the previous year, but it is believed that it was chiefly imported from the 'non-protected' districts, probably by the men composing the Reserves and militia, and in one instance by a detachment of the 19th Hussars direct from the Curragh. The thoroughly efficient working of the Contagious Diseases Act in the Cork 'protected' district must be a work of difficulty at all times, the district being large very straggling and the movements of troops incessant. The Act, even under these discouraging circumstances, is of some benefit, the admissions being about one-third less than in the non-protected districts.

"There has been no overcrowding worth mentioning during the year, and certainly none to which any disease was attributed.

"The following were the chief improvements effected during the year :—

"*Buttevant.*—Latrines improved. A kiln for drying earth for latrines. The drainage inspected and improved.

"*Cahir.*—A block of family quarters made over.

"*Carlisle Fort.*—An excellent dry-earth latrine for the women handed over.

"*Clonmel.*—A block of family quarters handed over.

"*Tralee.*—All the old cesspits filled in, and dry-earth latrines provided in every barrack, together with good urinaries. The ventilation of the barracks has been much improved, and ventilating grates introduced into the hospital. The drainage is being rapidly completed on the most improved plan.

United Kingdom.

"*Waterford.*—A large and very fine bath added to the ablution room. A latrine on 'dry-earth' principle built for the women.

"The drainage is generally approved. No complaints worth mentioning of the vicinities of the several barracks; most of them labour under the disadvantage of being built close up to and, in some instances, surrounded by the suburbs of ill-drained, ill-sewaged, and dirty towns. There are four gymnasia in the district, practice in which is reported to have been attended with very beneficial results."

FOREIGN STATIONS.

SANITARY REPORT.

Gibraltar.

Surgeon-General Huntly G. Gordon reports that "the average strength of the garrison during the year has been 4702·17. The ratio per 1,000 of mean strength admitted into hospital 671·42, the deaths, including 9 out of hospital, 5·32, and invalided 50·62. The average number constantly sick per thousand 37·25. *Foreign Stations.*

"The general health of the troops has been good, and there has been no medical occurrence worthy of special remark, except the state of the 42nd Royal Highlanders, who arrived at Gibraltar from Cyprus on the 27th November; although not quite so sickly as on disembarkation, the regiment still has about 170 men unfit for duty, and it is to be feared that it will not be in a very satisfactory condition for some time, as very many of the men have affections of the liver and spleen.

"The 71st Highland Light Infantry, also from Cyprus, have only been a few days of the year at Gibraltar; they do not appear to have suffered to the same extent as the 42nd Regiment.

"The number of invalids is much larger than usual, accounted for partly by an accumulation from the preceding year, sent home in January 1878, and partly by the large number of old soldiers on the Rock; nearly one-third of the invalids was composed of men over 17 years' service."

"STATEMENT of the leading sanitary services performed by the Royal Engineer Department in 1878.

"*Upper Road Guard.*—Provided latrine accommodation.

"*South Barracks.*—Pavilions Nos. 34 and 35 re-arranged; ventilation of waterclosets, and defective apparatus remedied.

"*North Front, Soldiers' Latrines.*—Adapted for dry-earth system.

"*Grand Casemate Barracks.*—Quartermaster's quarters, ventilation improved.

"*Engineer Lane, Officers' Quarters.*—Provided waterclosets.

"*Bell Lane, Officers' Quarters.*—Ventilation provided.

"*George's Lane, R.E.*—Staff sergeants' quarters, tank provided for rain-water.

"*Town Range Barracks.*—No. 1 field officers' quarters and No. 3 officers' quarters, provided waterclosets. Improved the ventilation of lock-up room.

"*Guard Rooms generally.*—Completed lavatory accommodation."

Malta.

Deputy Surgeon-General W. G. Watt observes:—"Having only so recently arrived in the Command, and not having been present during any period of the year for which this return is prepared, I cannot offer my personal experiences and observations regarding the health of the troops as I would wish to do.

"The general health of the troops, so far as admissions into hospital are concerned, stands very fairly with that of 1877 when compared with the ratio per 1,000 of mean strength, notwithstanding the increase of troops during the year; the mortality is, however, higher this year than in the previous one, and particularly in enteric fever, the number of deaths from this disease alone being 32 out of 94 admissions. The 1st Battalion Royal Scots had the greatest number of deaths from this fever when stationed at Floriana Barracks, and cases were admitted from almost every barrack in the Command; but I cannot trace the increase to any definite or specific cause, nor can it be attributed to any insanitary arrangements or to water used for drinking purposes,

Foreign Stations.

as the troops at Floriana Barracks have the use of the aqueduct water instead of collected surface rain-water as some of the barracks have, and yet they have furnished the largest number of admissions.

"Although the garrison was greatly increased by the Indian Contingent Force, yet no epidemic has prevailed. The sanitary arrangements appear to have been most excellent, and when the nature of the soil is taken into consideration and the difficulties which the rocky stone of Malta presents to the good sanitation of a camp, by fixing latrines, cutting drains, &c., I think the admirable arrangements that were made to meet these difficulties reflect the highest credit on those who planned and carried them out, and it is to these that, in my opinion, the excellent health of troops and immunity from disease of an epidemic nature is to be attributed.

"The scale of dietary was varied during the year by the issue weekly of three-quarters of a pound of biscuit since July, and one pound of preserved meat since September.

"The serge frock was substituted for the white summer one without any apparent ill effect on the health of the troops.

"The course of training at the gymnasia, of which there are two, tends greatly to the development of the physical powers of the men, and these institutions are well appreciated by the troops.

"The following sanitary improvements have been or will be carried out during the financial year 1878–79 :—

"*Light and Ventilation.*—Two windows have been made in the escarp to light and ventilate No. 1 soldiers' room, Floriana Barracks. The sergeants' messes in Forts Manuel and Ricasoli have had their light improved by extra windows. Forrest Hospital has been fitted with stoves throughout, and ventilated with inlet and outlet shafts to the roof. The cook-house at Fort St. Angelo has had its ventilation improved by an outlet shaft.

"*Water Supply.*—Charcoal filters on a pattern approved by the War Office have or shortly will be fixed in seven tanks. A trial of the first two fixed gave good results as regards removing organic matter in solution, found in all tank water in Malta.

"*Latrine and Ablution Accommodation.*—A new latrine has been built for the children at Lower St. Elmo. General latrines, one on each floor, for women and children, and one in the basement for the men and boys, have been constructed in the Comerata, and the existing waterclosets, one to each quarter, are in course of removal. The following latrines have been reconstructed: For women in St. Francis Barracks, Floriana; for men in the barrack stone yard, Valetta; for men at the right flank, Sally Port Guard; and for women in the Cottonera Hospital. The ablution room fittings in E and F blocks, Pembroke Camp, have been removed, and fresh water laid on to all the ablution rooms from the new tanks.

"*Drainage.*—The drainage of the slaughter-house, both surface and other, has been improved, as well as the arrangements for cleaning and flushing. Arrangements have been made for frequent emptying of the cess-pit of the Sanatarium, Citta Vecchia, without creating a nuisance; the sewage will be run into a cart by gravitation and removed to a distance by the contractor. Two cess-pits have been got rid of near St. Clement's Bastion by carrying the sewage to Palverista main sewer. The drainage of the Surgeon's quarters, military prison, has been remedied. The outlet of the main sewer, Fort Ricasoli, has been made to discharge into deeper water, and the sewer itself ventilated outside the fort and at a distance from any buildings.

"*Protection against the Sun.*—Jalousies have been provided at Forrest Hospital and at the married officers' quarters, Cottonera.

"*Sewage.*—The dockyard drainage scheme was brought into work since June last, and is being gradually pushed on to completion. Nearly the whole of the sewage of the Burmol and a large part of that of Senglea and Vittoriosa is now delivered into the sea, 1,500 yards to the east of the Grand Harbour, whence a current sitting nearly always to the east carries it out to sea. No annoyance has been caused by the outfall."

Cyprus.

Surgeon-General Sir A. D. Home, V.C., K.C.B., observes:—"From the landing of the troops for the occupation of the new station of Cyprus until the end of November the men were encamped at various places in the Island; at first in the ordinary bell tents, afterwards, as they became available, in the 'sepoy pals,' used for native troops in India. All the accessory accommodation was that used on field service. From about the first week in December the whole of the troops were quartered in huts of the Canadian pattern, single boarded, unlined, roofed with three-quarter inch boards covered with felt. Each hut gives 503 cubic and 54 superficial feet per man, that is, 10 men are lodged in each hut. The hospital consists of good lined and ceiled huts, giving 815 cubic and 96 superficial feet to each patient (12 in each).

"Everything in connexion with the lodging and dieting of the troops in the Command is at present provisional. The cantonment at Mathiati is only a temporary one, and the arrangements in it were contemplated as those sufficient for about four months' use, and in the cool weather only. At the present time a permanent cantonment for the troops has been decided on at a height of 4,500 feet above the sea, on one of the spurs of Mount Olympus, and a road to it is in process of construction.

"The food supply is plentiful and varied, but the quality is very indifferent; the necessity for importing meat from places where animals of good quality can be obtained is recognised however.

"The clothing of the troops is in general suitable; the extreme heat of the summer, and the relative cold of some of the days in winter, require a careful adaptation of existing articles of clothing to the temperature, rather than the introduction of others not now in possession of the soldier."

Dominion of Canada.

Deputy Surgeon-General G. A. Shelton reports:—"The troops in this Command have been very healthy during the year. The average strength has been, Officers, 89·91; non-commissioned officers and men, 1724·87. The admissions to hospital numbered 1,012, as compared to an almost similar strength in the preceding year of 951; this increase is accounted for by the fact of the arrival in November 1878 of the 101st Regiment from Cyprus, in which Island the regiment had been for three months (July to September) exposed to the combined effects of a climate—unhealthy at the time of its occupation—hard work under a semi-tropical sun, inadequate shelter, and food of an indifferent quality, added to which, the men had been somewhat debilitated by a previous residence at Malta for a considerable time. The disease from which they suffered is an ague in various types of a very severe order, producing great emaciation and debility, but happily entailing slight mortality, in so far as that no case proved fatal on the voyage to Halifax, nor can any subsequent death be fairly ascribed to the foregoing conditions; the health-giving qualities of this climate soon restored the regiment to fair efficiency, although some little time must elapse before the constitution of the sufferers be completely restored.

"No epidemic occurred during the year, either among the troops or married families, an occasional case of diptheria showed itself, but prompt precautions were effectually adopted to prevent its spread.

"The active co-operation of the Engineer Department in remedying local defects leave but little room for necessary alterations and proposals; the following are those which have been made during the year:—

"*Citadel.*—Officers' quarters, light improved and dampers remedied. Soldiers' quarters, light improved.

"*Glacis Barracks.*—Drainage to ablution room provided.

"*Station Hospital.*—Coal shed provided.

"*Wellington Barracks.*—Quartermaster's store provided. Storm sashes to officers' quarters.

"*Commissariat Office.*—Storm sashes provided.

"*Soldiers' Institute.*—Latrines and urinals provided.

"*Belle Vue House.*—Fitted up as an officers' mess.

Foreign Stations.

"IMPROVEMENTS and ALTERATIONS proposed in 1879–80.

"*Royal Artillery Park.*—Provision of canteen.

"*Station Hospital.*—Convert condemned linen store into wash-house. Provide additional kitchen accommodation. Construct conservatory over porch and verandah to foul linen store.

"*Citadel Barracks.*—Bread and meat store to be provided. Improve lighting. Pave and drain area of officers' quarters. Build officers' quarters and mess establishment.

"*Pavilion Barracks.*—Re-construction of ventilating flues.

"*Wellington Barracks.*—Provide bread and meat stores, regimental workshops, skittle alley, and racquet courts. Repair generally adult school, schoolmasters' quarters, and officers' latrines.

"*George's Island.*—Provide guard room and fire-engine house.

"A detailed report of the several barracks has been furnished by me in my Sanitary Report for 1876, and it may suffice to state that from the reports of the sanitary officer, from those of the medical officers respectively in charge, as well as from my personal inspection, I am enabled to write that the barracks and tributary buildings are in a good state of repair, afford sufficient accommodation according to the scale laid down, and are well warmed, ventilated, and lighted.

"The drainage is, on the whole, satisfactory; the situation of many of the barracks affords natural drainage, and the civil authorities improving that of the city are at the same time benefitting us.

"The troops are clothed suitably, according to the season, and great care and liberality is shown in providing abundant warm covering, as to blankets, boots, comforters, gloves, caps, and underclothing during the great cold in winter.

"There is an excellent gymnasium, furnished with all usual appliances, and under trained instructors, periodically inspected by the brigade-major and myself.

"Recreations are numerous, ball playing, racquets, boating, skating, theatricals, readings, bagatelle, reading rooms, &c., proving a source of contentment to the soldier."

Bermuda.

Deputy-Surgeon General James Sinclair, M.D., reports that:—"The general state of health of the troops serving in the Command during the year has been good; the average strength has been 2017·37, the number of admissions 1,325, or at the ratio of 656·98 per 1,000 per annum, being somewhat in excess of last year; the majority of cases were, however, not of a serious nature; nine cases of enteric fever were reported, four of these being admitted at St. George's, and were, in the opinion of the medical officer in charge, contracted in the town, the insanitary condition of which he remarks on, adding 'enteric 'fever is endemic in St. George's, and during the past year several cases of 'diptheria occurred.'

"A number of sanitary improvements have been carried out and others are noted for consideration in 1879. At Boaz the drainage has been improved and fresh drains are still in course of construction. A separate latrine for women and children is required at the station hospital, St. George's, and increased tankage and engine power for the supply of brackish water for sanitary purposes is desirable.

"The rations and cooking have been satisfactory. The ablution and bath accommodation is sufficient, and sea-bathing is constantly practised.

"With regard to the clothing of the men, I do not consider the scarlet and blue serge jackets at present in wear during the summer months suitable to this climate, the colour being objectionable in attracting the sun's rays to a marked degree. A light grey serge, or the white drill clothing which has hitherto been worn in Bermuda during the summer, being of light texture, cool, clean, and inexpensive, is far preferable in a sanitary point of view.

"The duties of the troops do not appear to have exerted any unfavourable influence on health during the greater part of the year, but during the

months of July and August employment on the Royal Engineer works was found to be too laborious, and produced such profuse perspiration and exhaustion as to induce the men to resort to the use of stimulants, cold water to excess, &c., the result of which may be seen in the large number of admissions for diarrhœa, dyspepsia, and debility; the temperature at this time was so high that several cases of sunstroke occurred; on this being reported the public works were suspended during the heat of the day from the 7th August to the 3rd September. *Foreign Stations.*

West Indies.

Deputy Surgeon-General S. H. Fasson remarks:—"The general health of the troops serving in the West Indies during the past year has been fairly good. As compared with the sickness of the preceding annual period, 1877, the admissions into hospital and the constantly sick were in excess to the extent of 25·67, and by 2·82 per 1,000 of strength respectively, but the death rate was less by 2·49 per 1,000 of strength.

"This year (1878), like its predecessor, was marked by a short outbreak of yellow fever at Jamaica, last year the seat of the epidemic was the hill station of Newcastle, this year it occurred at Port Royal, and the white troops were attacked; the detachment of the Royal Artillery quartered there were quickly moved to Apostles' battery situate on the opposite side of the harbour, a measure which was followed, as was a similar step adopted on the outbreak of the epidemic of this disease at Newcastle the year preceding, by a total cessation of the disease.

"The station hospitals have continued to afford ample and well ventilated accommodation for the sick, and in no instance has disease resulting from insanitary conditions been traced to have originated in them,

"There has been no change during the year in the sources of water supply at the different stations, these have been either 'rivers, springs, or rain-water 'stored in covered tanks, which have furnished water' good in quality and sufficient in quantity.

"The conservancy arrangements have been generally satisfactory and carefully attended to. At those stations, where from the level of the ground or the insufficiency of water supply 'the water flushed latrine system' was inapplicable, the 'dry-earth system' has been in operation; it has required great attention and careful supervision on the part of those placed in charge of it, but with these precautions taken it has worked well.

"The drainage has been generally good. At Up Park Camp further improvement has been effected during the year in the surface drains, and they are now equal to the requirements of the station.

"The following are the sanitary improvements in the barracks and hospitals occupied by white troops which have been carried into effect during the period, viz.:—

"*Barbados.*—Brick barracks, new tailors' shop provided; new drying-room provided to armourers' shop.

"*Royal Artillery Barracks.*—The infant school and married soldiers' kitchen converted into a sergeants' mess establishment, and a new kitchen built for the married soldiers.

"*Stone Barracks.*—Officers' quarters, sun-shades provided to windows.

"*Military Prison.*—An ablution room, 12 washing troughs and gratings provided.

"*Barrack Store.*—Shed erected on north side; bakehouse floor raised.

"*Gun Hill Barracks.*—Ablution room and bath provided.

"*Trinidad.*—St. James' Barracks, Commanding officers' quarters, cooking accommodation provided; Commissariat officers' quarters, servants' room constructed.

"*Jamaica.*—Newcastle, roof of bush (water) tank renewed; married quarters re-shingled; wash shed and married quarters enlarged; infant school converted into drying room for men's clothing; garrison stables enlarged; expense water tank renewed; press in commissariat bakery renewed; soldiers' barracks painted and limewashed; general improvements to roads and drains, also to barracks and hospital.

Foreign Stations.

"*Picquet House.*—Re-shingled and repaired; latrine converted into dry earth system.

"The following are the further sanitary improvements which I am of opinion are yet needed, and which I have recommended to the military authorities should be carried out with as little delay as practicable:—

"*Trinidad.*—St. James' Barracks, surface drain leading from staff married quarters requires to be connected with main surface drain; a dry earth closet to be constructed for the use of the staff sergeants' married quarters.

"*Jamaica.*—Newcastle, certain of the surface drains to be prolonged down the slopes in order to discharge their contents a greater distance from the cantonment; a swimming bath to be constructed; a small covered place provided in which to boil the water, &c., required to make the tea and coffee supplied in the recreation room; a gymnasium to be built as being much needed at a hill station where the men have so little means of employing their leisure time in recreative exercise."

West Africa.

Surgeon-Major T. Orton remarks that:—"Venereal diseases have been rife at Sierra Leone to a very unusual extent, owing to the entire absence of any preventive measures amongst the civil population.

"The chief cause of disease has been the climate and the prevalence of malaria; no preventive means (beyond careful sanitation in and about the barracks) are likely to lessen the prevalence of ague and remittent fever, excepting the carrying out of the proposed and sanctioned sanitarium at Leicester.

"At Cape Coast Castle the officers' quarters are in the fort, and badly situated for ventilation, and are very damp in the rainy season.

"A full and regular supply of condensed or other pure water for drinking purposes is also much required. The best and cheapest would be to conduct water from the Sweet River, as is done at Sierra Leone from Heddle's Farm.

"I have urged the necessity of providing condensed water for drinking purposes for the troops at Cape Coast Castle, but the officer commanding is of opinion that any condenser would require a professional engineer to keep it in order, and there is no engineer at Cape Coast.

"The improvements that have been carried out at Sierra Leone are the converting of most of the covered drains about the officers' quarters and soldiers' barracks on Tower Hill into open ones. This has been a decided improvement. The European women's waterclosets have also been much improved and screened off. A new cook-house has been provided for the band.

"No changes have been made in the rationing or clothing of the troops."

St. Helena.

Surgeon-Major Franklin Gillespie, M.D., the senior medical officer reports:—"The sickness and invaliding have been in larger proportion than last year, and I attribute this chiefly to the inferior moral and physical condition of the men of the 88th Connaught Rangers, and to the fact that the elements of the garrison have been more changed by movements of troops, but the Island has not lowered its reputation for healthiness in other respects.

"The ration consists of fresh meat on five days, and salt meat twice a week. The meat has been very good throughout the year, and there has been a plentiful supply of fresh vegetables, comprising potatoes, carrots, onions, cabbages, turnips, and French beans. There is a copious supply of fruit to be had, viz.: pears, apples, oranges, peaches, guava, grenadilla, wild raspberries, blackberries, bananas, mangoes, &c. There is an abundance of good fish.

"*Conservancy.*—The latrines at Ladder Hill are open sluices on a good slope and discharging on the face of the cliff over the sea. They are flushed daily and limewashed and disinfected when required. There has been nothing of much interest to call for remark this year.

"There has been a complete absence of miasmatic or zymotic diseases and of all sickness generally met with in the tropics, and in this respect the station has kept up its good reputation for healthiness. *Foreign Stations.*

"On the whole the climate for the year has been colder and wetter than usual, and the native population who are very susceptible to weather changes has suffered a good deal from pneumonia and catarrhal affections, but the troops have not suffered in any particular degree from these causes. Considering the peculiarities of service in this island, and the numerous temptations for young unmarried men to live an irregular life with its consequences, sickness and inefficiency, I am strongly of opinion that the men constituting the garrison should be specially chosen from the older and married men of a regiment."

Mauritius.

Surgeon-Major H. Ferguson, the senior medical officer, reports that:—"The sanitary state of the barracks, occupied by the troops, has been on the whole satisfactory.

"At Fort George the drainage from the cook-houses and wash-houses has been reported as unsatisfactory, being into underground tanks which admit of free percolation into the surrounding subsoil: attention has been called to this matter, and it is to be remedied at once.

"At Mahébourg Barracks the water supply has been reported as unsatisfactory. Recommended that steps be taken to bring into the barracks the new water supply from the Creole River which has just been introduced into the town.

"The following are the chief sanitary services executed by the Royal Engineer Department during the past year:—

"*Fort George.*—Repairs to casemate roofs and removing the soil from them.

"*Mahébourg Barracks.*—Erecting a new urinal for officers' mess, and salt water baths for women.

"*Mahébourg Hospital.*—Laying on water supply and providing earthenware basins to ablution room; erecting new bath room, with water laid on.

"The want of a hospital is greatly felt at Curepipe, and interferes very much with the beneficial effects which would otherwise result from the sanitarium; at present, no man requiring hospital dieting and treatment can be sent there, and if any of the invalids get a relapse, so as to again require hospital treatment, they have to be sent back to the place where they first contracted the disease; this, I need not say, is most unsatisfactory. The clothing is, in my opinion, suitable to the climate.

"Malarious fever was again very prevalent amongst the troops, the ratio of admissions being 1118·88 per 1,000, deaths 4·66 per 1,000. The civil population also suffered very much from this disease; the death rate was the highest that has been known since 1873, being 26·88 per 1,000. The partial drying up of the numerous marshes and beds of rivers through the island, caused by the unusually high temperature and drought (the rainfall being 11·40 inches below the average for the last eight years), may, I think, account for the greater prevalence of malarial fever.

"In the Report of the Registrar-General for the last quarter of the year, it is stated:—'A new disease broke out at the end of this quarter in the 'district of Moka, and has since spread to other localities, but it has not been 'yet clearly defined, though some medical practitioners are of opinion it is 'beri-beri. No deaths in the quarter were attributed to it.' Since that report was published, the disease has been clearly diagnosed as beri-beri, and has become epidemic all over the island, no situation seeming to give immunity from it. Up to the present it has confined itself altogether to the Indian population, and even amongst them, chiefly to those whose caste prohibits the use of meat.

"The chief civil medical officer informs me that the reports he has received from the medical officers who have had charge of most of these cases tend to show that the disease is amenable to treatment, particularly in those cases

Foreign Stations.

which come early under their observation; and also that there has been a decided decrease in the number of cases from the 1st to the 21st of this month.

Ceylon.

Surgeon-Major T. J. Murphy, the senior medical officer, remarks:—"The medical officer at Trincomalee, in reporting the occurrence of scurvy in the men at that station, attributes the disease to 'a deficient supply of succulent vegetables extending over a considerable period;' I think the ration needs improvement. I have recommended that English potatoes be issued daily, instead of being given to the troops only two days in each week.

"The Colombo barracks have been lighted with gas; a cookhouse has been built at Galle; a cell has been added to the guard room at Trincomalee. The sanitary condition of the interior of all barracks is carefully looked after, but at Colombo the vicinity of the barracks is not in a satisfactory sanitary state, on account of the want of adequate latrine accommodation for natives. I have represented the matter to the Major-General Commanding.

"There are no gymnasia in the Command."

China and Straits Settlements.

Deputy Surgeon-General R. Gilborne reports:—"The health of the troops at Hong Kong has been very unsatisfactory during the past year; phthisical affections have been unprecedentedly large. The amount of invaliding has been very great, entirely owing to the prevalence of chest affections, and the inferior class of recruits who joined the 74th Regiment. The rainfall was 2·72 inches greater than that of 1877. The health of the civil population has been good. The health enjoyed by the troops serving in the Straits Settlements must be considered good as compared with the preceding year. The 28th Regiment which left Hong Kong in the commencement of the year for the Straits Settlements (owing to their having suffered so much from paroxysmal fever contracted at Kowloon) have completely thrown off the susceptibility to this disease.

"The average strength of the white troops in the Command was 1,843; the number of admissions into hospital, 2,036; the deaths, 19; and the number sent to England as invalids, 163.

"At Kowloon, where the annual course of rifle practice takes place, and where the troops are usually encamped, malarious fevers are prevalent, I recommended, in consequence, that the men should be taken over and brought back daily in steam launches; this has been carried out, and the result has been most satiafactory.

"The following improvements and additions to the sanitary arrangements in the Command have been made:—

"*Hong Kong.*—Bathing rafts placed in front of Wellington, Murray, and North Barracks, at a sufficient distance from shore to secure clean water.

"*Hospital Ship 'Mecanee.'*—Two large port holes have been cut in the stern for better ventilation. Stoves have been supplied for use in the cold season.

"*Straits Settlements, Fort Canning.*—Two new tanks have been constructed during the year for the preservation of water for the use of the barracks.

"*Penang.*—A new guard room built for the military at the civil gaol; all the disused huts in the vicinity of the barracks have been removed; the hospital bath room floored, and the hospital repaired; a new dead house built.

"*Malacca.*—An old barrack room, which was in use by the troops, has been pulled down, and the men were removed (as a temporary measure until the room was rebuilt) to two rooms on the north of the barrack compound. A recreation room has been constructed out of the material of the old barrack.

"The lighting at Hong Kong is not satisfactory; oil still in use.

"The sanitary state of the latrines and urinals is satisfactory at all the stations, as is also the drainage.

"The amusements generally consist of cricket, boating, quoits, fives, &c., and appear to be enjoyed by the men. At Hong Kong there is a gymnasium where classes are held, with apparently good results, more particularly in the muscular development of the young soldiers. *Foreign Stations.*

"With reference to the hospital establishment at Hong Kong, I beg to draw special attention to the report of the medical officer in charge, on the conveyance of serious cases of illness from the shore to the hospital ship 'Meeanee' in open pulling boats. In my report for the year 1876 I strongly urged the necessity for providing some more suitable and efficient means of transport, and would repeat my recommendation that a covered steam launch should be allowed for this service.

"The hospital arrangements in the Straits Settlements are satisfactory."

Cape of Good Hope.

Surgeon-General J. A. Woolfreys, C.B., reports:—"The sanitary condition of the several stations has been generally satisfactory, and with the exception of a period in the campaign, when typho-malarial fever was prevalent, the general state of health of the troops has been good.

"Sanitary defects of an important character have been promptly attended to, and incidental repairs to barracks, hospitals, &c. have been regularly carried out.

"The following sanitary improvements have been made by the Royal Engineers during the year.

"*Cape Town.*—Earth-closets have been provided in the officers' quarters garrison hospital.

"*King William's Town.*—New latrine in No. 1, officers' quarters; increased latrine accommodation in officers' mess; Robin's air shafts provided in largest rooms, barrack blocks; increased drainage in cantonments; latrine fitted up for women.

"*Fort Napier, Natal.*—Iron tank provided for storage of water; temporary latrines to hospital, also additional lavatory accommodation; new hospital (brick) ward for 22 patients; a covered drain at back of Provost Prison.

"*Durban.*—Provision of additional latrine accommodation at Base Hospital, also deepening well.

"No alteration has been made in the soldiers' diets, nor in the clothing of the troops.

"No gymnasia exist in the Command."

India.

INDIA.

Bengal.

Surgeon-General H. Ker Innes, C.B., reports :—

Presidency Circle.

Fort William.—"The general health of the men in the Fort has maintained its ordinary high standard, contrasting widely with the condition of the troops before any radical sanitary improvements were introduced.

"*Conservancy.*—It has been proposed to connect the Fort drainage with that of Calcutta, but the proposal is one involving expense, and does not appear to offer any commensurate advantage.

"The latrine accommodation in the hospital is in the course of extension and improvement, and the corner verandah rooms on the upper floor are now planned as latrines.

"The barracks are lighted with gas, the general hospital by oil lamps only, affording insufficient light, the wards being very lofty. The introduction of gas, it is hoped, is only deferred.

"The water supply (which is noted as good and ample) is directly derived from the municipal main. There is, however, no direct connection by pipes between it and the general hospital, the water for which is carried in casks from the nearest tap.

"*Dum Dum.*—The barracks and hospital are good, and such plans as have been suggested by me for its improved ventilation have been carried out.

"The dead level of the site of Dum Dum renders drainage difficult, but its improvement by ditch cuttings is being attempted.

"No gymnasium exists.

"The construction of a wall round the tank from which the drinking water is derived has been recommended.

"The men of the 40th have suffered much from malarial fevers. It was intended that the regiment should have been transferred to the hills, but in consequence of the field operations in Afghanistan, this was found impracticable.

"*Barrackpore.*—Some improvements suggested by me two years since have been carried out in the old infantry one storied barrack, and useless buildings have been razed. Those occupied by the artillery, excellent in construction, are to be completed with a new forge and workshops.

"The station is below the high water level of the Hoogly, and its drainage therefore difficult; water usually stands within a few feet of the surface. A new scheme for its thorough drainage has been sanctioned by Government, and is about to be undertaken.

"The drinking water is obtained from the municipal pipes, and its quality is noted as 'excellent.'

"A new hospital is much needed, and a site for a building intended to accommodate the sick of both infantry and artillery has been selected.

"Malarial fevers have been very prevalent at this station, and this must continue to be the case so long as it remains in its present waterlogged condition.

"*Darjeeling.*—The barrack and hospital accommodation at this station is now satisfactory. One of the barrack buildings was accidentally burnt.

"The drainage is good, and the water supply derived from springs only, protected from all risk of contamination. A new dead house is noted as being needed.

"In consequence of the railway extension, the march to Darjeeling has been shortened by nearly three weeks, a great advantage when sending up convalescents from the plains.

"The general health is reported as good, and the benefit derived by the invalids from the change of climate as very marked.

Allahabad Circle.

"*Allahabad.*—Barracks and hospitals all in good order.

"Lighting by means of gas in all buildings except the fort.

"The Principal Medical Officer reports that sanitary requirements have been very generally met, excepting that the surface drains may with advantage be built of masonry, instead of mud. *India.*

"*Dinapore.*—The sanitary condition of this station is reported as good. The barracks are of the old pattern, thatched and raised on three foot plinths, and are kept in good repair. The drainage is efficient, and the only recommendation made by the Principal Medical Officer is the erection of new barracks on the standard plans, which, in the present state of the Indian finance, is not likely to be carried out for some years to come.

"*Benares.*—Barracks and hospital all of old pattern, the latter consisting of detached buildings of sorts which urgently need reconstruction. The erection of a new garrison hospital has been recommeuded and sanctioned.

"Latrines on the new standard plan are very necessary, and detached lavatories for the married quarters.

"*Chunar.*—The barrack accommodation is as good as can be expected in a fort of this kind.

"The hospital is a private bungálow (hired) about a mile distant from the fort. The accommodation is sufficient, but the rooms are low and badly arranged.

"New quarters for medical subordinates and hospital servants are required.

"*Cawnpore.*—Barracks for infantry on new standard plan; those for Royal Artillery of old construction, but good, and have been proved healthy.

"The infantry hospital is of inefficient size, badly arranged, and inconveniently constructed. The Royal Artillery Hospital is merely a hired private bungalow.

"The construction of a new hospital to contain all the European sick of the station is now under the consideration of Government, and the plans are being prepared.

"Pucka drains round the barracks are a sanitary necessity.

"*Jubbulpore.*—The barrack and hospital accommodation is good and ample, and in consequence of the withdrawal of the Battery of Royal Artillery, the two extra double storied barracks, half a mile from the infantry lines, have been appropriated.

"The general drainage of this station has been much improved.

"*Pachmarhi.*—This station has been the subject of much correspondence during the past year, and a special committee has been sitting to consider its defects and the means of remedying them.

"The outcome is a recommendation to remove the undergrowth from the vicinity of the station and allow a freer perflation of air by clearing the lower branches of the numerous trees, the cultivation of much of the jungly ground, and the planting with cereals of the marshy banks of the stream, which have heretofore been covered with a growth of reedy grass.

The medical officer reports that since these steps have been taken, the general health of the men has undergone a marked improvement, but it will be necessary to suspend judgment on this station till after the rainy season, when due comparison with the sanitary condition of former years can be made.

Gwalior Circle.

"*Morar.*—The sanitary condition of all the barrack buildings is stated to have been satisfactory.

"The Royal Artillery Hospital has been much improved by having the flooring relayed and the roof at the south end raised.

"Both it, and that appropriated to the infantry, are in good sanitary condition, well ventilated, and lighted.

"The site of the old cavalry lines has been levelled, and a garden for the growth of vegetables is being formed. A considerable number of trees have been planted in the Royal Artillery and right British Infantry lines, as well as in other parts of the station.

"*Fort Gwalior.*—The barracks are excellent double storied ones, in good order, well ventilated and lighted.

"The hospitals are also double storied and afford ample accommodation for the sick.

"Drainage natural and excellent.

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"Water supply from deep wells inside the Fortress, good and ample.

"Baths and lavatories in good order and sufficient.

"Latrines in good sanitary condition; dry earth system carried out, and the night soil removed to a distance of half a mile from the Fortress, where it is buried in pits.

"*Nowgong.*—The new barracks have been completed, and are now occupied; they are in all respects satisfactory.

No. 12 barrack room is appropriated as a station hospital, the upper story being occupied by patients, and the lower story used for offices, store rooms, &c., &c.

"The defective drainage in the rear of the infantry barracks has been much improved within the past year.

"*Saugor.*—The barracks are very old, and the roofs and flooring of some of them (both in Royal Artillery and Infantry lines) are in an unsatisfactory condition. The Principal Medical Officer of the circle brought these matters to the notice of the Major-General Commanding the district; the various defects were pointed out and remedies suggested, but it is unlikely that anything will be done short of the erection of new buildings, and this it has been determined to do.

Lucknow Circle.

"*Lucknow.*—A large sum has been set apart for the better drainage of the Dilkoosha lines; in other respects the sanitary condition of the station is apparently good. A considerable amount of enteric fever still continues to infect the 73rd Regiment now quartered there, a form of disease which always shows itself amongst corps cantooned at Lucknow on arrival from England. This fact is so pronounced that I have officially advised that it shall not in future be allotted to troops so circumstanced.

"*Bareilly.*—Bareilly, ordinarily one of our healthiest stations, yielded a large number of cases of enteric fever. After the arrival there of the 1/18 Regiment from Malta, the corps was succeeded by the 2nd Queen's, freshly come to the country, and soon after its arrival it was found necessary to detach a large number of men to Ranikhet on account of an outbreak of the same disease. During this time the wing at Moradabad remained comparatively healthy, although milder forms of fever, with enteric complications, showed themselves amongst the men; in this corps there have occurred 47 cases, 23 of them resulting in death.

"The station is especially free from the predisposing causes of marsh fevers, and the outbreaks in each of the above quoted cases seem due to causes independent of the locality.

The space afforded by the barracks is ample, and their construction excellent; the drainage and water supply at the same time being good.

"*Naini Tal.*—A gymnasium is noted as a requirement at this station, it being likely to afford the men amusement during the rains, and assist to restore their health and vigour.

"*Chowbattia.*—Married quarters are required at this station.

"The Principal Medical Officer also suggests that if Chowbattia is retained as a military station, the provision of a steam force pump to raise the water from the spring to the highest level of the cantonment would be advisable, both as a sanitary and an economical measure, in substitution of its transport in water skins.

"*Ranikhet.*—A similar recommendation is made regarding the supply of water for the barracks for this station, and it is further suggested that in the hills the men should cook for themselves as is the case at home.

The hospital accommodation is stated to be insufficient for a full regiment, and requires the addition of an infectious disease ward and improved space for the medical subordinates. These requirements have been officially brought to notice.

"The station of Ranikhet still maintains its high character for salubrity.

Meerut Circle.

"*Meerut.*—Since the date of my last report on the Meerut Division, very radical improvements have been effected in reducing the level of the canal, and therefore of the general water level from Roorkee downwards. The year

has been throughout India very fruitful in malarious fevers, yet the Principal Medical Officer, Meerut Division, reports that 92 cases of ague only have been admitted in 1878, thus affording a wider contrast to preceding years. In 1874 the admissions numbered 1,914, the strength and composition of the troops having remained about the same. *India.*

"The cavalry barracks are, on the whole, excellent in construction and arrangement, the majority of them are roofed with thatch.

"The infantry barracks are old and afford very insufficient space, the buildings themselves being much overcrowded; it is principally owing to this want of room that the infantry regiment is obliged to detach two companies at Fatehgarh.

"*Agra.*—Barracks for the most part double storied, and their sanitary condition satisfactory, but during the past two years they have afforded very numerous cases of enteric fever, due probably to the presence of a young and unseasoned regiment.

"The infantry hospital consisting of two old fashioned thatched buildings with single verandahs run north and south and get the full benefit of the sun's rays all day long.

"The estimated accommodation for 56 patients is often very insufficient, and constantly supplemented by the occupation of one of the double storied barracks.

"The partially enclosed compound is surrounded by buildings and in close proximity to a native bazaar, it is also inconveniently near the regimental canteen.

"There are no quarters for medical subordinates, and the native attendants on the sick live in the neighbouring bazaar, in constant communication with the inhabitants, amongst whom small pox is endemic and cholera outbreaks frequent.

"A site for a new hospital has been selected, and it is very desirable that the projected work should be commenced without delay.

"*Delhi.*—The barrack and hospital situated in the fort, are doubled storied ones of modern construction and in good sanitary condition.

"Very good drinking water is to be found in the fort, but the majority of the wells are brackish and the main supply for drinking purposes is now derived from the canal.

"The condition of the channel between Selimghur and the fort, and which forms the outlet of a large portion of the city sewage, has been represented to the authorities as requiring attention. The subject is under consideration.

"*Roorkee.*—The engineer and infantry barracks and hospitals are all in fair sanitary condition.

"There is no guardroom in the engineer lines, that in the infantry lines is in good order. Cells lofty with good ventilation, and protected by verandahs with thatched roofs.

"The drainage in the engineer lines is good, but that of the infantry has long called for improvement, the main drains being impaired and tainted by the refuse water from the bath rooms; trees have been planted to absorb the moisture, but the completion of the drain is still a necessity.

"*Landour.*—A few barrack rooms on the ground purchased by Government exist, the rest of the accommodation being afforded by hired buildings; the future of this very excellent sanitarium has long been uncertain, and it is very desirable that permanent barracks should be erected. The hospital affords ample accommodation and is well planned.

"The general conservancy and drainage are excellent.

"Water supply from natural springs, good and ample.

Sirhind Circle.

"*Umballa.*—The contracted space afforded by the Royal Horse Artillery barracks has before been noticed. The presence of two batteries occasioned some overcrowding, an inconvenience of very temporary duration, the strength being reduced by sending a detachment to the Hills.

"The cavalry lines afforded ample space, and this was still further extended by pitching tents as dormitories during the hot weather; the Carabineers are

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largely made up of young soldiers, and it was hoped in this manner that the number of enteric cases might be diminished.

"The infantry have always inadequate accommodation, but all mischief from this source is avoided by drafting to Solon a portion of the Umballa infantry garrison.

"When it was proposed to erect additional accommodation for the infantry at Umballa, I resisted it, and advised improved hutting at Solon, a measure since carried out.

"Each arm of the service has its separate theatre, and I some time since proposed that these establishments should be amalgamated, thus releasing certain barrack space, it was, however, represented that the recreation of the men would thereby be so much interfered with, that I eventually concurred with the Major-General in the advisability of letting matters alone.

"*Jullunder.*—The heavy rains of the season 1878, rendered the soil of this station, always difficult to drain from its unbroken level, wholly waterlogged, a condition to which the long railway embankment, which traverses longitudinally the natural watershed, has very materially contributed. Malarious fevers have extensively prevailed as a consequence, and the 100th Regiment occupying the cantonments, became so inefficient from this cause that it was removed to Sialkot, a change, the beneficial effects of which soon became apparent.

"The barracks, hospitals, and guardrooms are in good order. The roof ventilation of the hospital has undergone several improvements within the past year, and the planting of trees is being encouraged.

"The buildings require protection from the sun, and for this purpose it has been recommended that trees should be planted round them.

"*Kasauli.*—Extensive alterations and repairs have been carried out during the year, such as re-roofing several of the older buildings and the introduction of floor ventilation, and the improvement of the channels for surface drainage.

"The new hospital appears to be somewhat deficient in size, that for women is undergoing alteration and repair. Four of the married quarters are appropriated as cells and guard room.

"*Dagshai.*—Extensive alterations have been made in the depôt barracks.

"The hospital accommodation is somewhat deficient, but this is being remedied.

"*Subathu.*—The barracks consist of eight double storied buildings, six being occupied by single men and two by families. All these are of new construction; at the same time the old barracks which were objectionably situated and had fallen into a dilapidated condition have been removed.

"The new hospital, crowning a high ridge and dominating the barracks, is somewhat too much exposed during the winter weather, occupies a well chosen and airy site and has proved very healthy.

"New cells on the standard plan have been built.

"*Solon.*—The barracks consist of wooden huts without verandahs, each accommodating 24 men. The older buildings on a lower range have been found to yield a disproportionate number of cases of sickness. Their removal to a higher elevation has been recommended. In all the huts the addition of verandahs is very desirable.

"*Jutogh.*—The wooden barracks occupied by the artillery are not of very modern construction and are capable of improvement. Their ventilation is good. Excellent married quarters have been recently built together with guard room and battery offices.

"The station of Jutogh has recently been extended, and barracks for two companies of infantry have been erected, and it is intended to reduce the garrison of Subathu by this number.

"The hospital accommodation is being re-adjusted, and patients of both arms of the service will henceforth be treated under one roof. Structural improvements are in the course of introduction.

Lahore Circle.

"*Meean Meer.*—This station built on an ill-chosen site, has proved the most unhealthy of all our stations in this Command. Very large sums have been expended on improving the drainage, itself a source of much difficulty, from

the configuration of the ground and from the nature of the soil, underlying which, and at a depth of six feet, is an impervious bed of Kunkur. *India.*

"The barracks raised on a plinth, are single storied and fairly good, but the general aspect of the cantonment is bleak and uninviting, they are at present occupied by two batteries of artillery and an infantry battallion, but it is now in contemplation to reduce the strength of the force by a wing of infantry, the corresponding wing occupying Jullundur.

"The well water is impure and much impregnated with saline matters. A fresh supply drawn from the bed of the "Ravee" has been introduced.

"*Fort Lahore.*—The barracks for artillery and a company of infantry (elevated some 80 feet above the surrounding country), are reported healthy and in good sanitary order.

"*Ferozepore.*—At Ferozepore, like other stations in the Punjab, the excessive rains have caused much flooding of the adjacent lands, and malarious fever has in consequence been very rife.

"The Royal Artillery barracks are double storied, the infantry single storied; all are in a good sanitary condition.

"*Dera Ismail Khan.*—The barracks are double storied, but only 12 feet above the level of the river.

"The hospital, which consists of one large ward 74 feet long, is situated 200 yards to the north of the barracks and is reported as satisfactory.

"The sanitary condition of all the subsidiary offices is reported on favourably, as is the general drainage of the station.

"Water-supply from wells very good and ample at all times.

"During the year three new servants' houses were built, and a masonry drain leading from the hospital cook-room to the main drain was constructed.

"The removal of the jungle from the vicinity of the Fort wall is recommended as a sanitary measure.

"*Fort Govindgarh.*—The men are located in four bastions raised about 16 feet above the surrounding level. Each bastion consists of a large central room with two side rooms communicating with each other by means of arches.

"The hospital accommodation is very satisfactory, and the guardroom and cells in good order.

"Lodgments of water are apt to take place from the defective nature of the surface channels.

"*Sanitary Improvements.*—The fort drainage has been carried across the "ditch" in wooden sewers, instead of, as formerly, being allowed to run into the ditch and stagnate.

"The married quarters are so insufficient that few married men are sent to occupy the fort. The subject is one which has long been under consideration.

"*Amritsar.*—Within 1½ miles of the fort are situated the barracks capable of accommodating two companies of infantry. The station is a hot-bed of fever, and the water level seldom below 10 feet from the surface, a condition difficult to remedy from the very level nature of the country. I have on more than one occasion urged the reduction of the garrison in this cantonment, close to which the main line of the Punjab railway runs, but its maintenance is at present considered a military necessity. The barracks are of old construction, are built on a low plinth, and are passably satisfactory. Water supply pronounced good.

"*Sialkot.*—The cavalry barracks at this station are very good and their hospital accommodation also excellent. The infantry are about to be wholly withdrawn.

"The drainage of the neighbourhood is in a very unsatisfactory state, due, it is alleged, to the demolition of an old native "bund" erected to fend off the overflow of the many streams which in this level country are of common occurrence.

"*Fort Kangra.*—Barrack accommodation good and ample, more especially in consequence of the absence of married soldiers, who are not now sent on this duty.

"The old permanent hospital which was reported as unfit for the accommodation of the sick is now in the hands of the Public Works Department for alterations and repairs, and No. 1 barrack (formerly married quarters) is in use as a temporary hospital.

"Water supply from a spring 100 yards *outside* the fort, good and ample.

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"During the year a large tank near Nos. 1 and 2 barracks was emptied and repaired, and a small subsidiary settling tank was attached to purify the rain and surface water by which it is supplied.

"*Bhagsu.*—The barracks consist of two double storied buildings at an elevation of 6,100 feet. The position is healthy, the plateau easily drained, and the sanitary condition is good.

"Hospital situated 300 yards from barracks is in good order and satisfactory.

"*Dalhousie.*—No change in the barrack accommodation during the year.

"The hospital consists of No. 1 barrack temporarily appropriated for this purpose.

"The want of a proper hospital has been long felt, and the situation of the present one is objectionable. The erection of a new one is a great desideratum.

Peshawar Circle.

"*Peshawar.*—The barracks which are calculated to accommodate three batteries Royal Artillery and two infantry regiments are situate on a plateau raised some 50 feet above the sandy plain which stretches to the foot of the Sulieman range some 16 miles distant. Those of the Royal Artillery are single storied, forming three sides of a square, of old construction and built of sun-dried bricks on a low plinth. Each building consists of two rooms capable of holding 12 or 18 men, giving 88 superficial and 2,069 cubic feet per head.

"The infantry barracks now occupied by the 2/9th Regiment resemble those of the artillery in all essential particulars. Besides these there are four large double-storied buildings ranged in line at the northern face of the cantonment boundary adapted for defence; the heat of these in summer is great, while in winter they are comfortless and draughty. The original plan contemplated an extension of similar accommodation for both infantry battalions, an idea which has since been relinquished. Both the lower and upper stories are occupied by troops.

"The hospital accommodation is ample, that apportioned to the Royal Artillery, which is of more recent construction than the remainder, well lighted by clerostory windows, and capable of accommodating 102 men. One of the infantry hospitals adjacent to it is dark and cheerless. The two together have formed the base field hospital of the Khyber force, and have answered this end sufficiently well.

"Pucka channels carry off surface drainage, supplemented by ordinary trench drains coursing through the grounds which are laid out in gardens, grass, &c., &c.

"The general drainage is noted as wanting in masonry channels, and the sandy soil is much cut up after heavy rain.

"The objectionable practice of profusely irrigating compounds and grass lands was stopped during the year.

"A fairly good quality of water is obtained from wells, the new river source remaining incomplete.

"The quarters occupied by the married families in the old barracks are very defective, but a special block of family quarters in the neighbourhood of the new barracks has been erected.

"During the past year the following sanitary improvements were effected:—

"Several of the barracks were refloored with brick.

"A gymnasium was fitted up in No. 19 barrack, right infantry lines.

"One block Royal Artillery Hospital was refloored with bricks.

"Better light and ventilation were provided in the right infantry hospital, and several of the drains in the hospital lines were reconstructed of brick.

"The fort ditch was also drained and the channels in the Peshawar Jheel were restored.

"In May and June, enteric fever was present, and in July and September some cases of sunstroke occurred, while in the latter months of the year malarial fevers, usually prevalent over the whole of the Punjab, here assumed characters of great intensity, some of the cases of ague proving rapidly fatal.

"It is presumed that much of the malaria was due to the excessive rainfall in the end of 1877 and commencement of 1878, which caused springs to re-open and flow freely that had long been dormant.

"*Nowshera.*—During the past year the following improvements were effected:—

"A paved drain in the vicinity of the hospital was constructed, the urinals also were repaired.

"Additional paved drains are proposed, and increased planting of trees.

"*Attock Fort.*—On left bank of the Indus, rooms are ventilated by side doors and ridge openings, each is allotted to 14 men, giving an average of 1875 cubic feet per head.

"The hospital has accommodation for 32 men with an average cubic space of 2,543 cubic feet per head.

"During the year the flooring of the barracks has been relaid with slabs of shale.

"The health of the men during the latter months of the year was so indifferent from the prevalence of malarial fevers as to necessitate their being encamped at a distance from the fort.

"The fort stands very high above the river which forces for itself a rapid way over a stony bed, it is difficult to assign any specific force to the prevalent malaria.

"No case of enteric fever occurred during the year.

"*Campbellpore.*—The barracks well situated on rising sandy ground, 1,200 feet above sea level, give an average of 1,910 cubic feet of space per head.

"The sanitary desiderata are the construction of additional paved drains, the improvement of the cells, the construction of a well near the hospital, and the planting of more trees in the vicinity of the barracks. The health of the men was exceptionally good during the year, only one case of malarious fever and two of enteric having been admitted.

"*Rawal Pindi.*—During the past cold season the cavalry barracks have been utilised as married quarters by being partitioned off with matting, thus giving accommodation for the families of corps on active service.

"During the year the ground in the vicinity of the infantry barracks was levelled, thus improving the drainage considerably.

"The only sanitary desideratum noted is the re-flooring of some of the barrack and hospital rooms in which the bricks have been much worn.

"The health of the Royal Artillery was good, but in the 2/8th Regiment there was much prevalence of fever of a malarious type, and 15 cases of enteric were also treated.

"Small-pox, which prevailed throughout the year amongst the natives, appeared among the troops towards the end of October, and subsequently spread to the married families.

"*Murree.*—These barracks are for the most part only occupied during the summer months.

"The hospital is well situated, and reported as affording ample accommodation; it is in a good sanitary condition.

"The water supply, from springs protected from pollution, is good and ample.

"In the married quarters additional windows are desirable, and the drainage is capable of improvement.

"During the past year a lock hospital was opened, and verandahs added to some of the rooms.

"A sergeants' mess and a schoolroom are noted as being much required.

"The health of the depôt during the year was exceptionally good.

"*Gharual.*—This camp was healthy during the season, and the site is considered most suitable for a station, the erection of huts being strongly advocated.

"Some fever prevailed which was attributed to the dampness of the tents.

"*Thobba.*—An hospital was constructed with shingled roof and boarded floors; the erection of huts for the men is advocated.

"*Baragully.*—This station, 7,800 feet above sea level, is situated on a plateau on the top of a ridge.

"The men occupy wooden huts fitted with stone fireplaces, and having floors of rammed earth.

"The cells require improved ventilation.

"The water supply is obtained from a spring 500 feet below the level of the huts and is carried off by "puckáli" mules.

"The sanitary desiderata are, the flooring of the huts with planks, reconstruction of the kitchens which smoke, a sitting room for the canteen, better

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hospital accommodation, and the erection of a fireplace in the men's recreation room.

"*Changla Gully.*—This station is 8,460 feet high and distant about 10 miles from Murree.

"The men are hutted; additional windows and ridge ventilation are in the course of construction; boarded floors are much required.

"Quarters for a matron are considered desirable near the female hospital.

"The general health during the year of all these stations was very satisfactory.

"*Kalabagh.*—This station is situated on a spur 8,200 feet high. The men occupied huts, the ventilation of which being defective was improved by the addition of ridge ventilators.

"The hospital is a hut in which additional windows were opened to improve the lighting and ventilation.

"The general health was good; but, like all these gullies, venereal disease was prevalent, due no doubt to unlicensed prostitutes, whom the police have no power to apprehend.

"A cantonment boundary is being demarcated which will give the police authority inside it.

"*Khyra Gully.*—This station is 7,500 feet above the sea, and the men occupy huts like those in the other gullies. The huts are old and out of repair, are not ventilated in the roof, but air permeates freely between the boards of which they are built.

"The average cubic space was 820 feet per head.

"The hospital hut is in good order but requires a ridge ventilator.

"The water supply is noted as indifferent, that from the best tanks only is used after filtration.

"The removal of the bazaar from its present site has been recommended, its present proximity to the water supply is objectionable."

Madras.

Madras.

"Surgeon-General C. A. Gordon, M.D., C.B., reports:—The health statistics of 1878 compare unfavourably with those of 1877; the admission rate, 1336·12 per 1,000, exceeding that of 1877 by 193·14; the daily sick rate, 62·31 per 1,000, by 8·48; and the death rate, 21·42 per 1,000, by 4·35.

"The invaliding ratio, 45·77 per 1,000, shows a reduction of 0·52.

"Cholera and small-pox were both very prevalent among the native population, 47,167 deaths being ascribed to the former, and 56,360 to the latter. Cases of both occurred among the troops.

"Cholera caused one admission and one death among officers; 43 admissions, 28 fatal among men; 5 admissions, all fatal, among women; and 2 admissions (both recovered) among children.

"The admission ratio (cholera) for men 3·95 per 1,000, and the death rate in the same class 2·57 per 1,000, are both fractionally greater than in 1877, the former by 0·78, the latter by 0·85 per 1,000 of strength. Cases occurred in all circles; the disease prevailing most in the 2/16 Regiment, Secunderabad, and 89th Regiment, Rangoon.

"Enteric fever, so-called, shows a very decided reduction as compared with the year preceding. The admission ratio for the Command 0·64 per 1,000 of strength, showing a reduction of 5·26 per 1,000. There were 7 cases and 5 deaths against 65 cases and 22 deaths in 1877. A good deal of this decrease is probably due simply to a change in nomenclature, diseases returned as enteric fever in 1877 being classed under the heads of simple continued and remittent fevers in the present year (1878). The result of personal inquiries made by me only tends to strengthen the opinions expressed in my late special report on this disease, viz., that so-called enteric fever due to pythogenic or filth causes does not exist among British troops in this Command; that the cases of late years designated as of enteric or typhoid fever are in their actual nature such as were formerly looked upon as induced by endemic and climatorial influences acting upon recent arrivals, and modified by individual temperament, constitution, and habits, these terms being applied in a specific sense on the one hand, as indicative of a particular complication, on the other

of a condition of the general state of fever. The cases recorded of this disease were confined during 1878 entirely to the Hyderabad circle. *Madras.*

"*Sunstroke* caused 37 admissions and 23 deaths (6 out of hospital), against 19 admissions and 13 deaths (1 out of hospital) in the preceding year, the admission and death ratios for the two years, being 3·40 and 2·11, 1·72 and 1·18 respectively per 1,000.

"This affection was not limited to any particular station or regiment, the only station showing a preponderance of cases being Thayetmyo, where 9 cases, 4 fatal, were contributed by the 44th Regiment. All of these occurred between the 27th and 29th May, 5 being recorded on the 28th May. The mean maximum temperature in the shade during the week in which the outbreak occurred was 98·2 F. on the 28th May, it rose to 101·3 F., During the week referred to the amount of aqueous vapour present in the atmosphere was very great, and to this, combined to the high temperature, the attacks were attributed. No case could be traced directly to intemperance, some of the men attacked were total abstainers.

"The sanitary condition of barracks, hospital accommodation, water supply, drainage, conservancy, and other details connected with the health of the troops will be considered according to circles, and to the report on each will be appended a statement of improvements effected during the year.

Presidency Circle.

"*Climate.*—In Madras the hot season of 1878 was particularly trying. It commenced early, and from the beginning of March until the commencement of July the heat was excessive. Rain fell in July and lessened the temperature considerably. The N.E. monsoon set in during October, and was accompanied by very little rain. From November until the end of the year, the weather was cool and pleasant. The rainfall, 28·7 inches, was 19 inches under the average annual fall.

"The supply of water for the troops was sufficient for all purposes.

"At Trichinopoly the climate during 1878 is stated to have been fairly cool, rain falling during every month of the year, except in February and March. Malarious fevers were common in the detachment, 43rd Regiment (previously stationed at Bellary), and diseases of the digestive system in the battery of Royal Artillery which arrived from Rangoon on 12th January 1878. Three cases of lightning-stroke occurred on the evening of the 7th June during a thunderstorm. The men were struck while in the barrack room. One died instantly, the remaining two receiving severe shocks.

"At Bellary the S.W. monsoon was late in its appearance. Rain did not fall until the middle of July. It was then excessive and accompained by very high winds. The soil became saturated, and to this, among other causes, is attributed the very great prevalence of continued and malarial fevers among the troops.

"*Barracks.*—Fort St. George. These have undergone no change.

"Three serious accidents occurred in the 43rd Regiment from men falling over the verandahs; fracture of the skull and death resulting in two of the cases, while the third received very severe contusions. The verandahs require additional protection. The railings should be higher and the bars placed close together.

"*Poonamallee.*—Old barracks still in use, new ones sanctioned, but no funds at present available for the purpose.

"At Trichinopoly there has been no change: those of the Royal Artillery are old, their construction extremely faulty in regard to sanitary requirements, some of the rooms have no complete through ventilation, in others, the ventilation is along the greater diameter of the apartment, and, in all, the heat during the hot season is described as very great. In fact, the whole are ill-suited for occupation by troops. A good deal of correspondence has taken place relative to the existence of rice cultivation in the vicinity of these barracks. Inquiries made by me on the spot failed to discover that any actual evil to health had been thus occasioned.

"At Bellary the accommodation for the troops remains unchanged and is satisfactory, so too is that at the depôt, Ramandroog.

"The accommodation for married families at all stations was good and sufficient.

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"*Hospitals.*—The sick at Fort St. George are still accommodated in a part of the Madras General Hospital situated about half a mile from barracks. It has met all requirements.

"At St. Thomas' Mount the buildings appropriated for the purpose are suitable in all respects and remain unchanged. The accommodation afforded by the men's hospital is more than sufficient, the basement wards being seldom occupied.

"At Poonamallee the old hospital wards were in use during 1878, a new hospital has since been built, and was taken into use 25th February 1879.

"At Trichinopoly a special ward for contagious diseases was built and taken into occupation on 11th January 1879.

"*Water Supply.*—No change has occurred in the source, and the supply was adequate for all purposes. The wells are protected and the water is carefully filtered before use, Macnamara filters as well as those of the ordinary three chatty pattern being in use.

"*Drainage.*—At Fort St. George effected by open stone channels intended solely for the removal of surface water. These are connected with deep masonry drains suitably trapped and provided with iron gratings.

"At Bellary it is surface only. That connected with the Royal Artillery quarters is reported to be defective, the drains being simply channels cut in the soil without any facing of stone. Drains of dressed stone are being constructed for the Royal Artillery family quarters. The drainage of the infantry quarters is fairly good. Elsewhere the drainage arrangements have been good.

"*Conservancy.*—Dry-earth system in force at all stations, both in barracks and hospitals.

"*Lighting.*—Barracks at Fort St. George are lit with gas, elsewhere oil is in use. Several of the hospitals have been supplied with kerosine oil lamps, but the general introduction of this system of lighting is still delayed.

"*Ablution and Bathing Accommodation.*—Ample means for ablution are provided everywhere. Plunging baths exist at all stations (Ramandroog excepted). At St. Thomas' Mount the lavatories attached to the new barracks are fitted with force-pumps and reservoirs, and pipes with taps for its distribution, owing to mechanical defects this elaborate system has not worked satisfactorily, and the basins and other utensils have been filled by hand. At Trichinopoly the ablution rooms of the infantry are dark and too small; an additional one was to have been built but the work has been stopped.

"*Abstract of Improvements effected in* 1878.—*St. Thomas' Mount.*—1. Hutting lines provided for the native followers of one battery; similar lines will be constructed for the followers of the remaining battery who are at present scattered over the cantonment and neighbouring villages.

"2. Pulley apparatus substituted for pumps in three of the wells.

"3. A concrete surface drain constructed for each of the cottage family quarters to carry off the water from the bathrooms.

"*Poonamallee.*—1. Walls of north hospital blocks raised 3 feet and increased pitch given; pent tiled roof, and uninterrupted ridge ventilation applied to the new roof.

"2. A doubled storeyed hospital to accommodate 90 patients completed on 30th December 1878, and taken into occupation on 25th February 1879.

"*Trichinopoly.*—1. Hospital re-roofed. Walls raised 3½ feet, and ridge ventilation substituted for the Dormer windows formerly in use.

"2. Stone flooring of hospital raised 1½ feet and pointed with asphalt.

"3. A large pandal erected on one side of the hospital to keep off the sun, rendering the wards cooler and adding materially to the comfort of the sick.

"4. The floorings of all bathrooms and latrines asphalted and rendered proof against damp.

"5. Contagious disease ward erected, occupied 11th January 1879.

"6. A new latrine constructed for the Royal Artillery, and handed over on 13th March 1879.

"*Bellary.*—1. New canteen constructed for the infantry.

"2. Also a spacious and well-ventilated recreation and reading-room.

"3. Surface drains connected with the lavatories and wells suitably paved with stone, and prolonged in the direction of the plain.

"4. New cells constructed for the Royal Artillery guard-room.

"*Ramandroog.*—1. A connecting drain constructed between the hospital lavatory and the main drain. *Madras.*

"2. New drains made in rear of the married qaarters. The work is not yet completed.

Mysore Circle.

"*Climate.*—The climate of Bangalore during 1878 is stated to have been variable. Up to the middle of April but little rain fell, but from that date until July good showers occurred at intervals. Heavy rain fell in August and September. The hot season set in early, but was of shorter duration than usual. At Cannanore the hot season was depressing and febrile affections were common. The S.W. monsoon burst about 10th June accompanied by heavy rain, and during this period, dysentery, hepatitis, and pulmonary affections were prevalent.

"The highest temperature recorded was in April, viz. 94°, the lowest in December, 63°. Rain fell to the extent of 172·53 inches, being 47 inches in excess of that in the previous year, and about 32 inches above the average fall. At Wellington the rain-fall, 53·20 inches, was less by 12·68 inches than in 1877. Rain fell during every month of the year, February excepted, the heaviest falls being in April and September.

"*Barracks.*—These remained as in the previous year. All the barracks are single storeyed, those at Wellington excepted. The accommodation afforded by them has been suitable.

Abstract of Improvements effected in 1878.

"*Bangalore.*—1. Guard bed provided for the Royal Artillery lock-up room.

"*Wellington.*—A series of cells adjoining the hospital guard, were commenced to be built, and were half completed when, for financial reasons, the work was put a stop to.

"*Cannanore.*—1. Salt water swimming baths provided for the infantry.

"2. A piece of ground enclosed as a cricket field.

"3. A new station slaughter-house constructed.

"4. New butts provided for musketry markers.

"5. One of the family quarters converted into a guard room.

Hyderabad Circle.

"*Climate.*—The season of 1878 is described as having been very hot, particularly during the months of March, April, and May. The rainfall for the year was satisfactory, 46·13 inches, and many of the wells which for three years or more previously had not their full depth of water, were quite full at the beginning of the cold season. The latter commenced about the middle of November, the mean annual temperature was 82·4, the monthly mean ranging from 89°·9 in April to 75°·8 in December. The daily range was greatest in March, least in August, the average for the year being 23°·6. At Kamptee the hot season was severe, and the rains unusually heavy. The highest temperature recorded in the shade was 121° in June, the lowest 35° in December, the mean for the year being 80°·56. The total rain fall for the year equalled 52·12 inches. Notwithstanding the great heat at Kamptee there were but seven cases of sunstroke. During the rains, and for some time after, fevers of a malarial nature were prevalent, but they were, as a rule, of a mild type, and readily yielded to treatment.

"*Barracks.*—At Secunderabad, Kamptee, and Seetabuldee, the same buildings were in use as in the previous year and afforded suitable accommodation. At Kamptee the remodelling of barracks is being slowly carried out, only two blocks having been completed during the year, leaving six still unfinished. Excellent new family quarters are being constructed at Kamptee for the infantry. One range of these was completed and occupied during the hot weather.

"*Hospitals.*—The cavalry excepted, the troops at Secunderabad occupied the same buildings as in the previous year. The new hospital for the cavalry was taken into occupation on 20th February 1879. It is a single storeyed stone structure, 390 feet long, running N.E. and S.W. It is elevated about two

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feet above the ground, has a sloping corrugated iron roof, and is provided with a broad verandah placed on arched stone pillars. It contains eight rooms, viz. four wards, convalescent room, surgery, receiving, and orderlies' room. Each of the large wards accommodates 16 patients, each of the small wards 6. The building is estimated to accommodate 40 patients. In September and October, owing to the large number of sick, the accommodation was inadequate and tents had to be used. The building is suitably provided with separate contagious disease wards, lavatories, cook-houses, &c., &c.

"*Improvements effected in* 1878.—*Cavalry Barracks.—Secunderabad.*—1. New barrack room and attached offices provided for the regimental band.

"2. A new hospital completed and handed over.

"3. A verandah added to the back of the canteen.

"4. A shed provided for dry earth.

"5. A reading and prayer room (nearly completed).

"6. Saddle rooms for two troops (in progress).

"7. Apothecaries' quarters (in progress).

"8. Water laid on to all barracks, hospitals and quarters.

"9. Several alterations affected in the barrack wells in connexion with the new system of water service.

"10. A new skittle alley built.

"11. Kerosine oil introduced into the hospital.

"*Royal Artillery Barracks.*—1. The dry earth system introduced into barracks and hospitals.

"2. A new hospital in course of construction.

"3. A new orderly room and staff-serjeants' quarters provided.

"4. Water laid on to all barracks and quarters (nearly completed).

"5. Kerosine oil introduced into hospital.

"6. A new cooking range fitted to one of the barracks.

"*Infantry Barracks.*—1. Drainage of hospital kitchen improved.

"2. Latrines for guard on commissariat stores.

"3. Covered way provided for sentry over the magazine.

"4. Ventilating shafts fitted to hospital wards.

"5. Water laid on to barracks nearly completed.

"6. A "water house" converted into a guard room which, when completed, will relieve a guard objectionably located at the end of one of the barracks.

"7. One of the family quarters in process of conversion into an infant school-room. The present schoolroom to be converted into a canteen, the building presently in use being small, dark, and confined.

"8. Dry earth system of conservancy introduced into barracks.

"*Improvements effected.—Kamptee.—Royal Artillery Barracks.*—1. A block of barracks re-modelled.

"*Infantry Barracks.*—A block of barracks re-modelled.

"2. A new range of family quarters built.

"3. Drainage of vicinity of barracks improved.

"4. A new latrine constructed.

"5. New urinals provided.

British Burmah Circle.

"*Climate.*—At Rangoon, the weather during August, September, and October was hot and oppressive. The mean annual temperature for the year was 82°·50. Rain fell on 136 days, the total fall for the year being 85·40 inches, or a decrease of 16·60 inches as compared with 1877.

"At Thayetmyo the heat in March, April, and May was great. Nine cases of sunstroke (four fatal) occurred in the 44th Regiment between the 27th and 29th May. The highest mean temperature registered during the year was 108°·6 in May, the lowest 44°·2 in January. The total rainfall was 44·99 inches.

"At Tongoo the highest approximate mean temperature for the year was 88°·62 in May, the lowest 77°·22 in January. The rainfall for the year amounted to 61·39 inches, being less by 17·15 inches than in 1877.

"*Barracks.*—At Rangoon, the old barracks are being gradually removed and new ones constructed. A new barrack was completed for the infantry during the year, and another is in progress. At Thayetmyo new barracks were com-

pleted in the redoubt for the Royal Artillery, and taken into occupation on 26th October 1878. Elsewhere there has been no change. *Madras.*

"*Improvements effected in* 1878.—*Rangoon.*—1. A new barrack completed for the infantry.

"2. A second barrack for same corps in course of construction.

"*Thayetmyo.*—1. A cemetery made.

"2. New barracks completed for the Royal Artillery in the Redoubt.

"3. Dry earth system of conservancy introduced.

"4. Floors of urinaries, infantry barracks, asphalted.

"*Tongoo.*—1. Additional room for private ablution added to the women's ablution room in Royal Artillery barracks.

"2. New latrines provided for women, Royal Artillery.

"3. Floors of latrines in Royal Artillery lines asphalted.

"*Port Blair.*—1. A new recreation room with theatre and skittle alley attached in course of construction.

"*Syphilis.*—The admission ratio for syphilis (all forms) 125·09 per 1,000, exceeds that of 1877 by 5·72 per 1,000. There were no deaths. Compared with 1877 syphilis (all varieties) shows an increase in the Hyderabad (24·79), Mysore (14·66), and Presidency Circle (5·18) per 1,000, a decrease in that of Burmah, viz. 14·20 per 1,000. In the Presidency Circle the increase occurred at St. Thomas' Mount, Fort St. George, and Trichinopoly, a decrease being noted elsewhere. In the Mysore Circle, Bangalore, Cannanore, and Wellington, show an increase, Calicut a decrease.

"In the Hyderabad Circle all stations show an increase, slight in the case of Secunderabad and Seetabuldee, but decided in the case of Kamptee where it equalled 74·54 per 1,000 of strength. In the Burmah Circle, Tongoo, and Thayetmyo show an increase, equal in the case of the former to 37·81 per 1,000, in the latter to 4·96 only, while Rangoon shows a decrease of 57·51, and Port Blair of 6·32 per 1,000 as compared with the previons year.

"During 1878 there were 1,150 admissions for primary syphilis, and 1,008 for gonorrhœa, giving ratios of 105·70 and 92·65 per 1,000 respectively, against 97·31 and 90·96 in 1877. Compared with 1877 the Presidency and Burmah Circles show a decrease both in primary syphilis and gonorrhœa. In the Hyderabad and Mysore Circles an increase is recorded in both diseases.

"There were no admissions for venereal affections among women and children during 1878. In 1877 two admissions for hereditary syphilis in children, and one death from this cause were recorded.

"The results attending the prevalence of venereal diseases during the past year have been unsatisfactory. During 1877 the pressure of famine led many of the starving population to practise prostitution as a means of livelihood, and during 1878 this cause, although existing in a less degree than in the former year, was still present, and the statistics of these affections show that their prevalence had increased. To what has been said in former reports on the subject of venereal disease and the Contagious Diseases Act in this Command, I would now observe that it is unfair and misleading to look upon the prevalence of the former and the operations of the latter from the point of view suitable with regard to England, that in fact the more the social conditions of the lower classes of the population, with whom soldiers in this presidency consort, are considered the more apparent, does the fact become that the effect of the Act upon them can never under their peculiar conditions be in any respect like what it is in garrison towns in the United Kingdom. This aspect of the question is being worked out in special reports on the subject. All, therefore, that is necessary here is to allude to the above circumstances, and with reference to them, observe that there is no reasonable doubt that were it not for lock hospitals in military stations, however prevalent venereal diseases are among our troops, they would be far more prevalent, for, at least, some infected women are now treated in them, and for a time rendered harmless, whereas without them there would not be even this temporary safety with any of those who are accessible to men, unfortunately such classes are more numerous than for a time we had any idea of.

"No special arrangements or facilities exist at any station for nightly private ablution.

"*Confinement of Men to Barracks.*—On 22nd August 1878 I issued the following circular on the sanitary advantages, or otherwise, of confining

Madras. soldiers to their barrack rooms throughout the greater part of the day during the hot season, viz. :—

Circular.—"Opinions being divided as to the sanitary advantages, or otherwise, of confining soldiers to their barrack-rooms throughout the greater part of the day during the hot season, the attention of army medical officers in this Command is solicited to this subject with a view to their being so good as to communicate the result of their experience in regard to it for the information of the Surgeon-General in their annual reports for the current year.

"2. Briefly the question stands thus: On the one hand, it is said that by being kept in barracks during the heat of the day soldiers are protected against heat, apoplexy, and heat fevers; on the other, that while men so confined enjoy no such exemption, but rather the contrary, the fact of being confined induces a feeling of imprisonment in them which leads to their committing excesses when they get out, that they become etiolised by confinement, and that their general health standard becomes lowered.

"3. In addition, therefore, to expressing their personal views in regard to these points, the surgeon-general will be glad to receive a record of facts upon which the views expressed are based."

"The replies received show that opinion is pretty equally divided on the subject. In no case has it been clearly made out that the men have suffered from confinement to their rooms; that their general health has been thereby impaired, or that such confinement has led to excesses on getting out. Much of the difference of opinion expressed by medical officers has probably arisen from differences in the condition of the climate in the stations at which they have severally served."

Bombay.

Bombay.

Surgeon General J. A. S. Fogo, the Principal Medical Officer, reports :—

"*Barracks.—Deesa.*—The infantry barracks, which are old and faulty as regards construction have been improved. The mud floors have been replaced by concrete. The windows have been glazed, with sashes to open and shut; and the thick wooden bars by which they were formerly protected, and which obstructed both light and air, have been removed.

"*Karachi.*—The want of glazed doors in the infantry barracks, referred to in the previous report, is still complained of. The necessary alterations, however, have been since sanctioned by Government.

"*Poona.*—The seven new barracks at Ghorpuri, which were reported last year as having been commenced, are nearly completed. Two of the old barracks have been much improved with regard to ventilation. A new quarter-guard and cells, on the standard plan, have been taken into use during the year.

"*Mhow.*—The new horse artillery barracks are almost complete and ready for occupation.

"*Taraghur.*—The best and largest of the three barracks, and part of another, were accidently burned down soon after the opening of the Sanitarium, leaving only two for occupation. The barrack is being rebuilt and raised another story.

"*Indore.*—In one of the barracks in which cholera occurred, the floor under the pavement was found to consist of stinking black soil. This has since been replaced by concrete.

"*Cells.—Baroda.*—The garrison cells are still represented as small and hot, ill ventilated, and badly situated.

"*Deesa.*—The infantry cells, which are of the old pattern and insufficiently ventilated, are about to be replaced by a block of new cells which have just been completed.

"*Colaba.*—With reference to the low situation of the cells which was reported on last year, the Government sanctioned the erection of a new quarter-guard and cells; but the work has been delayed for want of funds.

"*Ventilation and Lighting.*—The ventilation of the barrack-rooms has on the whole been satisfactory, but complaints regarding the lighting are general.

The Kerosine lamps, referred to in the previous annual reports, having as yet been only supplied to hospitals.

"*Flooring.*—The earthen floors in the infantry barracks at Deesa have been replaced by concrete, and those of the artillery barracks by stone; one barrack still remaining to be flagged.

"*Ablution and Bath Accommodation.*—These have been, on the whole, satisfactory.

"*Sanitary Condition of the Vicinity of Barracks and Stations.—Colaba.*—The mangrove swamp referred to in the previous report continues to be the subject of severe comments by the medical officers.

"*Indore.*—The bad state of health of the men appears to have been caused by the nature of the soil round the barracks and hospital. This year, owing to the excessive rainfall, many defects, viz., the want of surface drainage and stinking condition of parts of soil beneath the barrack floors, become apparent.

"The sanitary measures and improvements recommended by two committees were carried out.

"*Poona.*—The insanitary condition of the tannery situated to the windward of the military prison and Wanowrie Barracks, noticed in the last report, has already been satisfactorily dealt with by Government.

"*Water Supply.*—Has been generally good and abundant.

"*Mhow.*—The project for improving the water supply by introducing water from the neighbouring hills is still in abeyance for want of funds. With a view to improve the present supply, several wells have been cleaned and deepened.

"*Nasirabad.*—The new waterworks have not been opened as yet, and the drinking water is still obtained from a single well at Dilwara.

"*Taraghar.*—The drinking water is obtained from a well in Ajmere, three miles distant, and much frequented by natives. A more convenient and safe source is desirable.

"*Hyderabad.*—Until the month of May water was obtained from a tank, but since then by pipes from the Indus waterworks.

"*Dieting of Troops.*—The rations on the whole have been very good. Several medical officers are of opinion that the vegetables are insufficiently varied, and that the quantity might be increased with advantage.

"*Clothing.*—The substitution of white serge or flannel coats for those of cotton worn in the hot season, and the compulsory use of flannel shirts are advocated by some medical officers.

"*Venereal.*—Under Bombay Act No. 3 of 1876, section 1, lock hospitals exist at the following stations: Deolali, Ahmedabad, Deesa, Aden, Karachi, Poona, Kirkee, Ahmednagur, Belgaum, Mhow, Neemuch, and Nasirabad.

"The amount of venereal disease has been on the increase, and is due to illicit prostitution which exists to a considerable extent, and the want of adequate police supervision to put it down."

APPENDIX.

APPENDIX No. I.

REPORT ON THE PROGRESS OF HYGIENE FOR THE YEAR 1878 AND PART OF 1879.

By F. DE CHAUMONT, M.D., F.R.S., Surgeon-Major, Professor of Military Hygiene, Army Medical School, Netley.

I. *Legislation.*

ALTHOUGH several Bills bearing on public health were introduced during the late session of Parliament, the results have been small, as most of them failed to become law. Almost the only Act of any importance has been that to amend the *Adulteration of Food and Drugs Act* (1875), for the purpose of remedying its ambiguity with reference to the purchase of samples for analysis. It is now enacted that the sale of an adulterated article under such circumstances shall be held to be to the prejudice of the purchaser within the meaning of the Act. At the same time the ingenuity of the adulterating salesman presents new phases, and in one case, at least (at Salford), a case was dismissed, where the vendor had sold the commodity as a "mixture of milk and water." Independent of the fact that there is no guarantee of the purity of the water employed, it ought not to be in the power of a vendor to diminish the nutritive value of any article at his own discretion. It is surely possible to draught a Bill so that it shall be both comprehensive and intelligible. Other countries suffer in the same way, for instance, in Holland there has long existed an enactment against adulteration of "*Food.*" On one occasion a quantity of *anise-seed* was entered in one of the ports, which, on examination, was found to contain a large quantity of *hemlock*, but because anise-seed was scheduled as a *drug* and not as a *food*, the law was powerless to deal with it. In our legislation this has, of course, been carefully provided for by including food and drugs in the Act.

The Habitual Drunkards' Bill, a purely permissive measure, has also passed.

The Noxious Gases Bill, a measure greatly needed, was, unfortunately, withdrawn.

An important Order has been issued by the Privy Council, relative to dairies, cowsheds, and milk shops, providing for their proper registration, lighting, ventilation, air-space, cleansing, draining, and water supply.

II. *Work of Societies, &c.*

1. The Sanitary Institute of Great Britain holds its Congress this years at Croydon, under the presidency of Dr. B. W. Richardson. Amongst other changes which this Society is introducing, a project has been formed for starting a school of instruction in hygienic subjects, to include general and special hygiene, prevention of disease, the hygiene of engineering and architecture, and sanitary law. Complaints have justly been made that there are no means by which surveyors and inspectors of nuisances can acquire the knowledge expected of them and necessary for their work. It is hoped that if this scheme can be satisfactorily carried out that this want will be in some sort supplied, at least so far as the Metropolis is concerned.

2. At the meeting of the British Medical Association at Cork, the Public Health section presented several important features. Under the care of Dr. J. Lane Notter (Assistant Professor of Hygiene at Netley), and Dr. Martin the arrangements were very successful, and good papers and discussions were obtained. The President, Dr. Grimshaw,* delivered an able address "On the Public Work of the British Medical Association." The first question for discussion was "The influence of Drinking Water in originating or propagating Enteric Fever, Diarrhœa, Diphtheria, and Scarlatina." The subject was introduced by Dr. Andrew Fergus, of Glasgow, and papers read by Dr. A. Carpenter, Dr. J. Lane Notter, Dr. E. Ballard, Dr. Norman Kerr. The second question was "How to deal with Convalescents from Infectious Diseases," and it was recommended that a committee of the Association should be formed to investigate it thoroughly. Among other papers was one by Dr. Notter "On the practical study of Disinfectants," which has been printed in Dublin Journal Medical Science. The experiments were made in the laboratory at Netley, and are of such importance that I have thought it advisable to reproduce them in this Report, with a few additional remarks (see page 217).

3. The International Congress of Medical Science met this year at Amsterdam, September 6th to 13th, and was attended by a large concourse of *savants* from all countries.

In the section of Public Health several important questions were discussed, such as quarantine, adulteration of food, choice of drinking-water, &c., some of which will be referred to further on.

4. "*L'Association Internationale pour l'Eau potable.*"—This is a society which was started last year at Paris with the view of exciting attention in all countries to the important question of drinking water. Mr. E. Chadwick was elected président d'honneur, and M. Gubler, of Paris, president, but the lamented death of the latter leaves the office at present vacant; vice-presidents, representing different countries, were also elected. Advantage was taken of the Congress at Amsterdam to convene a preliminary meeting of the Association, arrangements for which were made by M. J. G. Jäger, vice-president for Holland, and founder of the society. The first general meeting takes place at Turin in 1880, on the occasion of the International Congress of Hygiene.

5. The German Society of Hygiene holds its meeting this year in Stuttgart.

6. "Le Congrès International d'Hygiène" will hold its third biennial meeting at Turin in 1880, probably in August, but the date is not fixed. It promises to be highly successful. All information may be obtained by applying to Professor Pacchiotti, of Turin, who will be glad to receive the names of any persons desirous of attending the meeting.

III. *Literature.*

1. Revue d'Hygiène et de Police Sanitaire."

   This is a new Journal of Hygiene, appearing monthly (G. Masson, Paris), under the editorship of M. E. Vallin, médecin principal, the well-known Professor of Hygiene at the Val-de-Grâce. The first number appeared in January of the present year, and its reputation has been well sustained, the list of "collaborateurs" being sufficient guarantee of the excellence of its contents. It is now the official organ of the "Société de Médecine Publique et d'Hygiène Professionnelle."

   This is the third Journal of Hygiene established in France, the two others being "Les Annales d'Hygiène et de Médecine Légale," published monthly, and "Le Journal d'Hygiène," the organ of the Société Française d'Hygiène, published weekly.

2. The "Sanitary Record," now the only Journal in England specially devoted to Hygiene, has appeared since the month of July last in a monthly form instead of weekly as before.

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* This gentleman has since been appointed to the important post of Registrar-General of Ireland in succession to the late Dr. W. M. Burke.

3. "National Board of Health Bulletin."

This is a weekly publication issued by the National Board of Health, Washington, D.C. Very detailed accounts are given of the measures taken against the epidemic of yellow fever, which has raged with such virulence in the valley of the Mississippi.

4. Jahresbericht über die Leistungen und Fortschritte auf dem Gebiete des Militair-Sanitätswesens. Bearbeitet von Dr. Wilhelm Roth, General-Arzt, 1 cl. und Corps-Arzt des XII. (Königl. Sächs.) Armee-Corps. V. Jahrgang. Bericht für das Jahr, 1878. Berlin, Hirschwald.

This is the fifth yearly Report, published by Dr. Roth, on the work and progress of military medical affairs in different countries. It is as usual very full, extending to 112 pages 4to., and contains valuable contributions from both German and foreign military surgeons. A very useful feature is the copious list of references to the current literature of the day on the various questions treated of. Like all the undertakings of its distinguished editor this Report shows a great amount of labour and research, with a scrupulous care to ensure accuracy in its abstracts and references.

5. Tenth annual Report of the State Board of Health of Massachusetts, January 1879.

The contents of this volume consist of the general report of the Board and various papers of hygienic interest. One of the most important of these is "A contribution to the study of Ventilation," by Edward Cowles, M.D., Resident Physician and Superintendent of the Boston City Hospital, with Chemical Examinations by Edward S. Wood, M.D., Professor of Chemistry, Harvard Medical School. Reference to this paper will be made further on.

6. Transactions of the International Medical Congress of Philadelphia, 1876, Philadelphia, 1877.

Two important papers are to be found in this Report, Woodworth on Quarantine, and Satterthwaite on Disease Germs.

7. Traité d'Hygiène Publique and Privée, par Michel Lévy.

A new edition (1879) of this well-known and valuable work has made its appearance this year.

8. Sanitary Engineering, by Baldwin Latham, C.E.

A second edition of this work came out in the end of 1878.

9. House Drainage and Water Service, by J. C. Baylis, New York, David Williams.

This is a useful book, although there are some points to which exception would be taken in this country.

Some other works will be referred to under special headings.

IV. *Special Points of Hygiene.*

1. *Water.*—Appended is a table of analyses of drinking water, examined in the laboratory of the Army Medical School. It has been drawn up by Surgeon-Major J. L. Notter, and is generally on the same plan as that of last year. On a future occasion I hope to present the microscopic results in a tabular form with more detail, so as, if possible, to obtain some definite information as regards the forms characteristic of good or bad waters. This we are at present hardly in a position to do, and it is further to be regretted that, when samples are sent, information with reference to disease believed or suspected to be connected with the supply is very seldom furnished. In the present table the "Remarks" give the report furnished with the analysis of each sample.

TABLE OF WATER ANALYSES - - -

Station.	Source.	Physical Characters.	Microscopic Characters.	Qualitative Tests.			
				Oxidizable Matter indicated by Gold Chloride.	Nitric Acid.	Iron.	[illegible] Acid.
ENGLAND.							
Aldershot -	No. 2 Well, G. Lines.	Slightly yellow, no turbidity, small sediment, good lustre and taste, no smell.	Mineral grit, amorphous matter, Monadina, Rotifer vulgaris, the exuviæ of Entomostraca.	Trace	Large	Trace	[illegible]
Aldershot -	No. 1 Well, D. Lines.	Slightly yellow, no turbidity, small sediment, good lustre and taste, no smell.	A little mineral grit, total absence of animal or vegetable life.	Trace	Present	Trace	[illegible]
Aldershot -	Wash house, F. Lines.	Slightly yellow, no turbidity, very small sediment, very good lustre, flat taste, no smell.	Mineral grit, total absence of animal or vegetable life.	Trace	Present	Trace	[illegible]
Aldershot -	No. 2 Well, D. Lines.	Slightly yellow, no turbidity, small sediment, good lustre and taste, no smell.	Amorphous and ferruginous matter, no animal or vegetable life.	Trace	Present	Large	[illegible]
Aldershot -	No. 1 Well, N. Lines.	Yellow, no turbidity, some sediment, good lustre and taste, no smell.	Ferruginous matter and mineral grit, no trace of animal or vegetable life.	Trace	Present	Large	[illegible]
Aldershot -	No. 1 Well, M. Lines.	Yellow, slight turbidity, some sediment, good lustre and taste, no smell.	Amorphous matter, and mineral grit, no forms present.	Present	Present	Trace	[illegible]
Aldershot -	No. 1 Well, O. Lines.	Yellow, some turbidity and sediment, good lustre and taste, no smell.	Ferruginous matter, but no trace of animal or vegetable life.	Trace	Present	Large	[illegible]
Aldershot -	Well in General Anderson's Quarters.	Slightly yellow, no turbidity, small sediment, good lustre and taste, no smell.	A few particles of mineral grit only.	Trace	Present	Trace	[illegible]
Aldershot -	Adjutant-General's Quarters.	Slightly yellow, slight turbidity, some sediment, fair lustre and taste, no smell.	Mineral grit and ferruginous matter, total absence of animal or vegetable life.	Present	Large	Large	[illegible]
Aldershot -	No. 1 Well, J. Lines.	Slightly yellow and turbid, small sediment, fair lustre and taste, no smell.	Mineral grit and ferruginous matter, no trace of animal or vegetable life.	Trace	Large	Large	[illegible]
Beverley -	Receiving tank, 5th Brigade Depôt.	Yellowish, no turbidity, small sediment, lustre and taste good, no smell.	Vegetable débris and fibres in a state of decay, amorphous matter, solitary vorticella, minute infusoria.	Trace	Present	Trace	[illegible]
Beverley, York.	Well - -	Slightly yellow, not turbid, very small sediment, good lustre and taste, no smell.	Mineral grit and amorphous matter, mycelium and spores of Fungi.	Present	Present	Trace	[illegible]
Canterbury	No. 2 Well, Sterry Road.	Whitish, no turbidity, large sediment, fair lustre and taste, no smell.	Amorphous matter, mycelium and spores of Fungi, crystals of carbonate of lime.	None	Trace	None	[illegible]
Canterbury	Stream, near Strong Road Cottages.	Whitish, and turbid, some sediment, lustre dull, taste flat, no smell.	Mineral grit, cotton and linen fibre, very small diatoms, no trace of animal life.	Trace	Large	None	[illegible]

Table of Water Analyses.

Hardness. Degrees of Clark's Scale.		Chlorine, Grains per Gallon.	Ammonia, Parts per Million.		Solids, Grains per Gallon.		Oxygen required (determined by Permanganate of Potassium, Heat, and Sulphuric Acid), Parts per Million.		Nitrous Acid, Parts per Million.	Remarks.	No.
...al.	Fixed.		Free.	Albuminoid.	Total.	Fixed.	For Total Oxidizable Matter.	For Organic Matter only.			
...70	4·55	3·8192	None	None	17·4000	14·9000	0·6600	0·5400	0·3450	Fit for use	1
...85	2·80	2·3312	None	None	11·5500	10·5000	0·1400	0·0600	0·2300	Fit for use	2
...85	2·80	2·3312	None	None	11·5500	10·5000	0·1400	0·0800	0·2300	Fit for use	3
...70	4·20	2·8272	None	None	13·3000	10·8500	0·3000	0·1400	0·4600	Fit for use	4
...30	5·95	2·6288	None	None	15·7500	13·5000	0·2200	0·1400	0·2300	Fit for use	5
...60	3·50	4·7120	0·2880	None	20·6500	16·1000	0·3000	0·2200	0·2300	Reaction suggests contamination with house refuse. Unfit for use.	6
...10	2·45	1·9344	None	None	10·5000	8·7500	0·2200	0·1800	0·1150	Fit for use	7
...35	2·10	3·1248	None	None	15·7500	13·3000	0·2600	0·1800	0·2300	Fit for use	8
...45	8·75	3·9168	None	None	23·8000	18·5500	0·3000	0·2200	0·2300	Evidence of previous contamination. At present fit for use.	9
...70	5·25	3·7200	0·1172	0·0560	19·6000	17·5000	0·1800	0·1400	0·1150	Usable	10
...	4·20	1·6368	0·1400	0·1932	26·9500	25·2500	0·2000	0·1800	0·0575	Unfit for use	11
...	5·25	1·6368	None	0·0480	29·4000	28·3400	0·1800	0·0600	0·3450	Fit for use	12
...	4·37	1·8352	None	None	32·2000	28·7000	0·6600	0·6200	0·1150	Fit for use	13
...	7·00	1·7360	None	0·1104	19·9500	18·9000	0·3400	0·2600	0·2300	Usable	14

Station.	Source.	Physical Characters.	Microscopic Characters.	Qualitative Tests.			
				Oxidizable Matter indicated by Gold Chloride.	Nitric Acid.	Iron.	
Canterbury	Ditch end of culvert.	Whitish and turbid, dull, flat taste, no smell.	Very small Naviculæ, cotton and woollen fibres, amorphous matter, mineral grit.	Trace	Large	None	
Fort Carlisle	Fort well, 86′ deep	Slightly yellow, no turbidity, small sediment, good lustre and taste, no smell.	Mineral grit, sand, particles of carbonate of lime, no trace of animal or vegetable life.	Trace	Slight	Trace	
Caterham, Surrey.	Caterham Waterworks.	Very slightly yellow, very small sediment, good lustre and taste, no smell.	A few particles of mineral grit, a few crystals of carbonate of lime.	None	Trace	None	
Caterham, Surrey.	Metropolitan District Asylum Supply.	Very slightly yellow, no turbidity, good lustre and taste, no smell, appreciable sediment.	Minute Amœbæ, vegetable débris, dyed woollen and cotton fibres, mineral grit, amorphous matter, Epithelium, Monadina, brown granular matter, Leptothrix Ochræa, micrococci.	Present	Large	Trace	
Chattenden	Well - -	Clear, no turbidity, small sediment, very good lustre and taste, no smell.	Mineral grit and crystals of carbonate of lime.	None	Present	None	
Chobham -	Well, 12′ deep, near W. D. Warders' quarters.	Yellow, slightly turbid, large sediment, fair lustre and taste, no smell.	Spores of Fungi, several Acari, living and dead, epidermis of grass; ferruginous and amorphous matter.	Present	Large	Present	
Clifton, York	Lunatic Asylum -	Slightly yellow, no turbidity, small sediment, good lustre, fair taste, no smell.	Epidermis of grass, brown matter, crystals of carbonate of lime, minute Amœbæ.	Trace	Present	None	
Halifax -	Tank over Wellington Block.	Clear, no turbidity, small sediment, very good lustre and taste, no smell.	Vegetable debris, amorphous matter, mycelium and spores of Fungi, no trace of animal life.	Trace	Present	Trace	
Halifax -	Station Hospital	Slightly yellow, no turbidity, very small sediment, good lustre and taste, no smell.	Sediment hardly appreciable, no trace of animal or vegetable life.	Trace	Small	None	
Hoo Fort - -	Artesian Well -	Slight turbidity, very large sediment, good lustre, flat taste, no smell.	Finely divided granular matter, ferruginous matter, no trace of life.	None	Present	Large	
Hythe - -	Pump at Fort Sutherland.	Yellow, turbid, large sediment, flat taste, no smell.	Minute Amœbæ, Monadina, spores, oscillatorians, bits of wood, fibres of clothing.	Present	Present	Trace	
Hythe Fort	Well at married quarters, Rifle Range.	Yellow, large sediment, fair lustre, flat taste, no smell.	Mineral grit and ferruginous matter in small quantity, Amœbæ, Rotifer Vulgaris, Euchelys, Actinophrys, Aspidisca, Chœtonotis, brown granular matter, probably vegetable débris.	Trace	Large	Present	
Hythe - -	Well on Rifle range.	Yellow, large turbidity and sediment, fair lustre and taste, no smell.	Mineral grit, a few minute Amœbæ, but no other trace of animal or vegetable life.	Present	Present	None	
Isle of Wight, Parkhurst.	No. 1 Well, 240′ deep.	Slightly yellow, not turbid, some sediment, fair lustre and taste, no smell.	Amorphous granular matter, minute Amœbæ and Monadina.	Large	Very large.	None	

Hardness. Degrees of Clark's Scale.		Chlorine, Grains per Gallon.	Ammonia, Parts per Million.		Solids, Grains per Gallon.		Oxygen required (determined by Permanganate of Potassium, Heat, and Sulphuric Acid), Parts per Million.		Nitrous Acid, Parts per Million.	Remarks.	No.
Total.	Fixed.		Free.	Albuminoid.	Total.	Fixed.	For Total Oxidizable Matter.	For Organic Matter only.			
°	°										
7·35	7·00	1·736	None	0·0018	17·8500	16·4500	0·5400	0·5000	0·1150	Fit for use - -	15
12·25	11·55	4·8112	None	0·0332	39·9000	37·5000	0·2600	0·2600	None	Very hard, but fit for use.	16
1·30	1·05	0·9425	None	None	10·1500	9·8000	0·1000	0·1000	None	Fit for use - -	17
4·90	4·20	0·9424	None	0·0488	25·2000	22·0500	0·1000	0·1000	None	Microscopic examination unsatisfactory, filtration therefore advisable.	18
40·10	25·65	5·5056	None	0·0780	65·4500	60·9000	0·4200	0·3800	0·1150	Organically pure, but hardness in very great excess.	19
3·60	3·50	0·8432	0·1240	0·1136	11·9000	11·2000	1·2200	1·1000	0·3450	Usable after careful filtration.	20
18·10	4·55	0·9424	None	0·0840	19·9500	19·2500	0·5400	0·1800	1·0350	Usable - - -	21
2·45	1·92	0·5456	None	None	7·0000	6·3000	0·7000	0·6200	0·2300	Fit for use - -	22
2·10	1·92	0·5456	None	None	7·7000	7·000	0·7000	0·6600	0·1150	Fit for use - -	23
32·00	12·25	13·6400	0·1464	None	46·5500	45·5000	0·1800	0·1800	None	Organically pure, but an excess of chlorine and fixed hardness.	24
2·45	1·05	2·2320	None	0·0960	17·8500	15·4000	0·6600	0·5400	0·3450	Filtration advisable as microscopic examination shows impurities.	25
2·50	1·05	1·0416	0·1184	0·1752	18·9000	18·2000	0·5400	0·4600	0·2300	Unfit without careful filtration.	26
2·80	1·05	1·0416	None	0·1608	20·3000	19·5500	0·5400	0·4600	0·2300	Unfit for use without filtration.	27
11·55	5·95	9·9496	0·7000	0·1600	43·0500	38·5000	0·9000	0·7000	0·5750	Unfit for use - -	28

Station.	Source.	Physical Characters.	Microscopic Characters.	Qualitative Tests.			
				Oxidizable Matter indicated by Gold Chloride.	Nitric Acid.	Iron.	Sp... Pr... A...
Parkhurst -	No. 2 Well, 242' deep.	Slightly yellow, not turbid, small sediment, good lustre and taste, no smell.	Mineral grit, pine cells, brown amorphous matter, mycelium and spores of Fungi, Monadina, and crystals of carbonate of lime.	None	Present	Present	Tra...
Parkhurst -	No. 3 Well, 250' deep.	Slightly yellow and turbid, large sediment, fair lustre and taste, no smell.	Ferruginous matter, Chlorococcus cells, and black beaded Fungi.	Trace	Present	Large	Tra...
Parkhurst -	No. 1, deep Well,	Very yellow, turbid, large sediment, fair lustre and taste, no smell.	Amorphous matter (dirt), a few Amœbæ and grit.	Present	Large	None	Ne...
Sandown I. of Wight.	Sandown Water Company.	Yellowish, not turbid, small sediment, fair lustre and taste, no smell.	Mineral grit and a few mycelia and spores of Fungi.	Trace	Present	Trace	Ne...
Landguard Fort.	Boring, 150' deep	Yellow, great turbidity, large sediment, dull lustre, brackish taste, no smell.	Ferruginous matter and mineral grit, no trace of animal or vegetable life.	Trace	Large	Large	Ve...
Landguard Fort.	Boring, 1¼ hours' pumping.	Yellow, great turbidity, large sediment, dull lustre, brackish taste, no smell.	Mineral grit and ferruginous matter in large quantity.	Trace	Large	Large	Ve...
Landguard Fort.	Boring, 3¾ hours' pumping.	Yellow, great turbidity, some sediment, dull lustre, very salt taste, no smell.	Ferruginous matter and mineral grit.	Trace	Present	Large	Ve...
Lichfield -	Reservoir and springs.	Slightly yellow, no turbidity, very small sediment, good lustre and taste, no smell.	Mineral grit and amorphous matter, mycelium and spores of Fungi	None	Present	Trace	Tra...
Newcastle -	Rain water from the roofs of buildings.	Yellow and turbid, some sediment, fair lustre, flat taste, no smell.	Mineral grit, spores of Fungi, epidermis of grass, cotton fibre, amorphous matter.	Present	Large	None	Tra...
Preston -	Fulwood Barracks	Slightly yellow, no turbidity, large sediment, good lustre and taste, no smell.	Monadina, Oscillatoria, Oxytricha, Astrionella, Cyclotella, Fragillaria, Navicula, amorphous matter.	Trace	Small	Trace	Ne...
Shornecliffe	Rifle Range Well, Hythe.	Slightly yellow, not turbid, small sediment, good lustre, no smell.	Mineral grit, decaying vegetable matter, spores and mycelium of Fungi, fibres of linen, cotton, and wool, dyed wool, numerous Monadina, Actinophrys Sol, Oxytricha, Cyclops Quadricornis, living Enchelys.	None	Large	None	Ne...
Shrewsbury	Not stated -	Slightly yellow, no turbidity, small sediment, very good lustre and taste, no smell.	Mineral grit, and amorphous matter, crystals of carbonate of lime, minute Monadina, &c.	None	Present	None	Tra...
Towthorpe -	Artesian Well, 310' deep.	Yellowish, slightly turbid, very large sediment, fair lustre and taste, no smell.	Ferruginous matter in large quantity, sand, grit, and amorphous deposit, minute Monadina.	Trace	Large	Large	Ve...
Towthorpe -	Artesian Well -	Slightly yellow, not turbid, good lustre and taste, no smell.	Ferruginous matter, carbonate of lime, and minute monadina.	Trace	Large	Very large.	Ve...

Hardness. — Degrees of Clark's Scale.		Chlorine, Grains per Gallon.	Ammonia, Parts per Million.		Solids, Grains per Gallon.		Oxygen required (determined by Permanganate of Potassium, Heat, and Sulphuric Acid), Parts per Million.		Nitrous Acid, Parts per Million.	Remarks.
...l.	Fixed.		Free.	Albuminoid.	Total.	Fixed.	For Total Oxidizable Matter.	For Organic Matter only.		
...0	1·75	4·0176	0·9240	None	28·7000	27·6500	0·3400	0·2600	0·2300	Free from active organic impurity. Fit for use.
...0	2·80	5·3072	0·9360	0·0240	37·1000	36·0500	0·4200	0·3800	0·1150	Usable - -
...0	1·75	11·5368	0·5112	0·0732	40·2000	45·8500	0·7400	0·5400	0·5750	Filtration advisable before use.
...5	1·75	2·3312	None	0·1120	17·8500	17·1500	0·9400	0·7400	0·5750	Usable - -
...0	57·00	228·0112	25·5200	0·1728	440·6300	408·0000	0·7000	0·7000	None	Unfit - -
...0	51·51	228·0112	24·7000	0·1680	516·2296	495·2146	0·7000	0·7000	None	Unfit - -
...0	58·90	228·0112	21·6000	0·1456	563·7546	503·6046	0·7000	0·7000	None	Unfit - -
...5	4·55	0·9324	None	None	19·6000	16·1000	0·4200	0·3000	0·3450	Fit for use -
...0	8·75	2·5296	11·2000	0·3600	20·6500	19·9500	1·5000	1·4000	0·2875	Unfit for use -
...0	2·10	0·5436	None	None	7·0000	5·9500	1·0600	0·9400	0·3450	Fit for use -
...0	0·70	0·4200	0·3336	None	15·4000	12·6000	0·4200	0·3400	0·2300	Well should be cleaned, water usable.
...0	8·05	0·7440	0·0708	0·0684	29·7500	27·3000	0·5000	0·4800	0·0575	Fixed hardness excessive, usable.
...0	56·00	1·5968	0·3600	0·1000	123·2000	119·7000	0·8200	0·7000	0·3450	Unfit on account of great hardness and excess of magnesium salts.
...5	57·75	1·8352	0·4144	None	136·8500	136·5000	1·0200	0·7800	0·6900	Unfit for use -

Station.	Source.	Physical Characters.	Microscopic Characters.	Qualitative Tests.			
				Oxidizable Matter indicated by Gold Chloride.	Nitric Acid.	Iron.	Sul phu ric Acid
IRELAND.							
Armagh -	Taps, married soldiers' quarters.	Very yellow, turbid, large sediment, flat taste, no smell.	Decaying vegetable débris, mycelium and spores of Fungi, Oscillatorian filaments, active Navicula and Synedra, Spirochæta, small Oxytricha, Monadina, Thecamonadina.	Large	Large	None	Nil
Armagh -	Well in a private house, water had previously smelt and tasted badly, Well since pumped out and cleaned.	Clear, little or no colour, no apparent sediment, taste agreeable, a faint smell (of lime ?) when cold, none on heating.	Some vegetable débris; carbonate of lime in pellicle, crystals and amorphous particles, Keronia (starved), Oxytricha Lingua, minute Oscillatorians, numerous minute Amæbæ, some globular and nucleated, others with Pseudopodia.	Very faint.	Present	Nil	Mas hes
Belfast -	Tap in reservoir -	Yellowish, no turbidity, slight sediment, very good lustre and taste, no smell.	Numerous Diatomaceæ, living and empty, mycelium and spores of Fungi, monads and minute Ciliata, Anguillula, Rotifers, Bosmina, Difflugia, Oscillatoria of small size.	Slight reaction.	Large	Trace	Mas
Belturbet -	Underground tank, rain-water.	Yellowish, not turbid, small sediment, very good lustre, flat taste, no smell.	Amorphous matter and mineral grit, minute Amæbæ and Monadina.	Large	Large	Trace	Tra
Belturbet -	Underground rain-water tank.	Yellow, slightly turbid, small sediment, good lustre, flat taste, no smell.	Mineral grit, carbon and dust, cotton and linen fibres, silk, crystals of carbonate of lime, no trace of animal or vegetable life.	Present	Large	None	Tra
Cahir -	Reservoir filled by a mountain stream.	Yellowish, slightly turbid, small sediment, very good lustre and taste, no smell.	Sediment hardly appreciable, a little mineral grit.	Trace	Present	None	Nil
Fermoy -	Knockmaning Springs.	Slightly yellow, not turbid, very small sediment, good lustre and taste, no smell.	Sediment hardly appreciable, only a little mineral grit.	Trace	Trace	None	Nil
Fermoy -	No. 2 Well, Old Barracks.	Slightly yellow, not turbid, small sediment, very good lustre and taste.	A little mineral grit, a few particles of carbonate of lime, no trace of animal or vegetable life.	None	Trace	None	Tra
Kilduff -	Stream A. -	Yellow, slight turbidity, small sediment, very good lustre and taste, no smell.	Mineral grit and vegetable debris, hardly any living forms, a few Monadina.	Present	Very large.	None	Nil
Kilduff -	Stream B. -	Yellow, slight turbidity, very large sediment, fair lustre, flat taste, no smell.	Amorphous matter very finely divided, ferruginous matter, mineral grit.	Trace	Very large.	Large	Tra
Kilkenny -	Tank near Hospital.	Whitish, not turbid, small sediment, very good lustre and taste, no smell.	A little mineral grit but no trace of animal or vegetable life.	Trace	Present	Trace	Tra

Hardness, Degrees of Clark's Scale.		Chlorine, Grains per Gallon.	Ammonia, Parts per Million.		Solids, Grains per Gallon.		Oxygen required (determined by Permanganate of Potassium, Heat, and Sulphuric Acid), Parts per Million.		Nitrous Acid, Parts per Million.	Remarks.	No.
Total.	Fixed.		Free.	Albuminoid.	Total.	Fixed.	For Total Oxidizable Matter.	For Organic Matter only.			
° 8·40	° 2·80	1·0416	0·0904	0·3000	11·2000	10·5000	1·9500	1·6200	0·9487	Unfit for use - -	43
15·32	4·20	3·2305	None	0·0603	22·7500	21·2860	0·2400	0·2150	0·0719	Usable, but the microscopic examination is is not quite satisfactory, well should be examined from time to time.	44
7·70	3·67	0·7440	None	0·1402	14·3500	9·8000	2·0200	1·7800	0·6900	A peat water, impurity chiefly vegetable. Fit for use.	45
5·95	3·85	2·1328	0·6500	0·2592	17·1500	16·4500	1·7400	0·8200	2·6550	Unfit for use - -	46
6·30	2·10	1·8352	1·3252	0·2720	17·5000	16·8000	2·0600	0·9400	3·2200	Unfit - - -	47
4·20	1·40	0·9432	0·1476	0·0254	5·6000	5·2500	0·5400	0·4200	0·3450	Fit for use - -	48
2·45	2·10	0·7440	None	0·0260	6·3000	4·9000	0·2600	0·2600	None	Fit for use - -	49
19·95	5·95	2·3312	None	None	38·8500	36·0500	0·6000	0·2000	1·1500	Fit for use - -	50
4·55	2·10	0·7440	None	0·1232	7·3500	6·6500	1·3800	0·7000	1·9580	In this sample the albuminoid ammonia is in excess, but the absence of free ammonia and small amount of chlorine show that it is of vegetable origin, probably from peat. Fit for use.	51
4·90	1·75	0·7440	None	0·0512	11·9000	9·8000	1·5000	1·3800	0·3450	Fit for use - -	52
24·50	6·12	1·6368	None	0·0800	37·4500	34·6500	0·3600	0·2200	0·2300	Fit for use - -	53

Station.	Source.	Physical Characters.	Microscopic Characters.	Qualitative Tests.			
				Oxidizable Matter indicated by Gold Chloride.	Nitric Acid.	Iron.	Sulphuric Acid.
Kinsale -	No. 2 Well -	Slightly yellow, some sediment, no turbidity, good lustre and taste, no smell.	Yellowish-brown fungus, mycelium and spores of Fungi, Leptothrix Ochrea.	None	Large	Present	Trace
Kinsale -	No. 2, sample, source?	Slightly yellow, no turbidity, small sediment, very good lustre and taste, no smell.	A few particles of mineral grit, no trace of animal or vegetable life.	None	Present	Trace	Trace
Londonderry	New well - -	Yellowish, not turbid, small sediment, fair lustre and taste, no smell.	Mineral grit, amorphous matter, crystals of carbonate of lime, no trace of animal or vegetable life.	Trace	Present	None	Trace
Monaghan -	Underground tank, rain-water.	Yellowish, turbid, some sediment, good lustre and taste, no smell.	Amorphous matter, mineral grit, and crystals of carbonate of lime.	Trace	Large	None	Trace
Nenagh -	Rain water -	Yellow, not turbid, small sediment, flat taste, no smell.	Fine Oscillatorians, minute Amœbæ, Bacteroids, free and in Zoogloea form, spirilla, brown cells, amorphous matter.	Present	Large	None	None
Omagh -	Public Water Co.'s Fountain.	Yellow, some turbidity, sediment small, very good lustre and taste, no smell.	Anthophysa tubes, numerous ciliated animalculos, brown granular matter, Trinema Acinus, Difflugia, Monas, Monostyla, Aspidisca.	Present	Large	None	Trace
Templemore	No. 1 Well -	Yellow, slight turbidity, small sediment, fair lustre and taste, no smell.	Vegetable débris in a decomposing state, solitary Vorticella, a few Monadina.	Very large.	Very large.	None	Large
Templemore	No. 2 Well -	Yellow, slightly turbid, some sediment, fair lustre and taste, no smell.	Vegetable débris, wool and cotton fibres, minute Amœbæ, and amorphous matter.	Very large.	Very large.	Trace	Large
ABROAD.							
Cyprus -	Pump No. 1, Mathiati.	Slightly yellow, not turbid, small sediment, good lustre, fair taste, no smell.	Hardly any appreciable sediment, a little mineral grit.	Trace	Trace	Trace	Trace
Cyprus -	Pump No. 2, Mathiati.	Slightly yellow and turbid, some sediment, fair lustre, flat taste, no smell.	Mineral grit, mycelium and spores of Fungi, fine and colourless Oscillatorians, some minute moving bodies, fibres of clothing.	Present	Large	None	Trace
Cyprus -	Pump No. 2, near Mathiati.	Whitish, slightly turbid, some sediment, fair lustre and taste, no smell.	Mineral grit and amorphous matter, mycelium and spores of Fungi.	Trace	Present	None	Trace
Cyprus -	Pump No. 2, near Mathiati.	Whitish, slightly turbid, small sediment, fair lustre and taste, no smell.	Amorphous matter, mycelium, and spores of Fungi, Amœbæ, mineral grit.	Present	Present	None	None
Cyprus -	Ali's Well, Mathiati.	Whitish, not turbid, small sediment, very good lustre and taste.	A few Monadina, mycelium and spores of Fungi, crystals of carbonate of lime.	None	Present	None	Trace
Cyprus -	Well in Camp, 71st Highlanders.	Whitish, not turbid, small sediment, very good lustre and taste, no smell.	Mineral grit, and carbonate of lime, a few spores of Fungi, amorphous matter.	None	Present	None	None
Gibraltar -	Experimental boring, Southport ditch.	Whitish, not turbid, very small sediment, good lustre and taste, no smell.	Amorphous matter, mineral grit, and crystals of carbonate of lime.	Trace	Present	Trace	Very large

Hardness. Degrees of Clark's Scale.		Chlorine, Grains per Gallon.	Ammonia, Parts per Million.		Solids, Grains per Gallon.		Oxygen required (determined by Permanganate of Potassium, Heat, and Sulphuric Acid), Parts per Million.		Nitrous Acid, Parts per Million.	Remarks.	No.
Total.	Fixed.		Free.	Albuminoid.	Total.	Fixed.	For Total Oxidizable Matter.	For Organic Matter only.			
12·65	9·10	3·9184	None	None	24·1500	20·3000	0·3400	0·2600	0·2300	Fit for use - -	54
11·55	8·15	3·2240	None	None	23·1000	22·0500	0·3400	0·3400	None	Fit for use - -	55
11·29	6·30	1·7360	0·0262	0·0264	18·5500	17·8500	0·2200	0·2200	None	Fit for use - -	56
8·30	4·90	1·1408	None	None	16·8000	16·1000	0·4600	0·3000	0·4600	Fit for use - -	57
1·75	1·05	0·1736	0·3904	0·0672	4·9000	4·8000	0·3800	0·3800	None	Impure, probably from storage.	58
2·45	1·75	0·8432	None	0·1750	7·3500	5·9500	2·8600	2·8600	None	Evidently a peat water, containing some vegetable impurities but little or no animal. Fit for drinking purposes.	59
29·75	20·12	15·0288	0·0120	0·1824	67·2500	64·7500	1·3800	0·6200	2·1850	Unfit for use - -	60
11·87	7·00	3·6208	1·5784	0·1824	45·5000	39·2000	0·5400	0·4600	0·2300	Unfit for use - -	61
14·00	2·45	2·0336	None	0·0888	21·3500	21·0000	1·3000	0·8600	1·2650	Rather suspicious, probably improved since first drawn.	62
14·00	2·45	2·0336	None	0·2368	21·7000	21·0000	2·6200	1·7800	2·4150	Unfit for use - -	63
14·35	2·45	2·0336	None	0·1300	23·1000	21·7000	0·5800	0·3400	0·6000	Sample sent in bottle with *old* cork.	64
13·30	2·45	2·0336	0·1180	0·0816	23·1000	22·4000	0·9400	0·5800	1·0350	Evidence of previous contamination.	65
16·80	1·05	3·6208	None	None	26·9500	24·1500	0·2200	0·1800	0·1150	Fit for use - -	66
15·05	2·10	2·3312	None	None	23·1000	22·0500	0·3800	0·3000	0·2300	Fit for use - -	67
47·60	23·10	42·2432	0·1344	None	129·1500	112·3500	0·7400	0·3400	1·1500	Unfit - - -	68

Table of Water Analyses - - -

No.	Station.	Source.	Physical Characters.	Microscopic Characters.	Qualitative Tests.			
					Oxidisable Matter indicated by Gold Chloride.	Nitric Acid.	Iron.	
	England.							
1	Aldershot -	No. 2 Well, G. Lines.	Slightly yellow, no turbidity, small sediment, good lustre and taste, no smell.	Mineral grit, amorphous matter, Monadina, Rotifer vulgaris, the exuviæ of Entomostraca.	Trace	Large	Trace	
2	Aldershot -	No. 1 Well, D. Lines.	Slightly yellow, no turbidity, small sediment, good lustre and taste, no smell.	A little mineral grit, total absence of animal or vegetable life.	Trace	Present	Trace	
3	Aldershot -	Wash house,' F. Lines.	Slightly yellow, no turbidity, very small sediment, very good lustre, flat taste, no smell.	Mineral grit, total absence of animal or vegetable life.	Trace	Present	Trace	
4	Aldershot -	No. 2 Well, D. Lines.	Slightly yellow, no turbidity, small sediment, good lustre and taste, no smell.	Amorphous and ferruginous matter, no animal or vegetable life.	Trace	Present	Large	
5	Aldershot -	No. 1 Well, N. Lines.	Yellow, no turbidity, some sediment, good lustre and taste, no smell.	Ferruginous matter and mineral grit, no trace of animal or vegetable life.	Trace	Present	Large	
6	Aldershot -	No. 1 Well, M. Lines.	Yellow, slight turbidity, some sediment, good lustre and taste, no smell.	Amorphous matter, and mineral grit, no forms present.	Present	Present	Trace	
7	Aldershot -	No. 1 Well, O. Lines.	Yellow, some turbidity and sediment, good lustre and taste, no smell.	Ferruginous matter, but no trace of animal or vegetable life.	Trace	Present	Large	
8	Aldershot -	Well in General Anderson's Quarters.	Slightly yellow, no turbidity, small sediment, good lustre and taste, no smell.	A few particles of mineral grit only.	Trace	Present	Trace	
9	Aldershot -	Adjutant-General's Quarters.	Slightly yellow, slight turbidity, some sediment, fair lustre and taste, no smell.	Mineral grit and ferruginous matter, total absence of animal or vegetable life.	Present	Large	Large	
10	Aldershot -	No. 1 Well, J. Lines.	Slightly yellow and turbid, small sediment, fair lustre and taste, no smell.	Mineral grit and ferruginous matter, no trace of animal or vegetable life.	Trace	Large	Large	
11	Beverley -	Receiving tank, 5th Brigade Depôt.	Yellowish, no turbidity, small sediment, lustre and taste good, no smell.	Vegetable débris and fibres in a state of decay, amorphous matter, solitary vorticella, minute infusoria.	Trace	Present	Trace	
12	Beverley, York.	Well - -	Slightly yellow, not turbid, very small sediment, good lustre and taste, no smell.	Mineral grit and amorphous matter, mycelium and spores of Fungi.	Present	Present	Trace	
13	Canterbury	No. 2 Well, Sterry Road.	Whitish, no turbidity, large sediment, fair lustre and taste, no smell.	Amorphous matter, mycelium and spores of Fungi, crystals of carbonate of lime.	None	Trace	None	
14	Canterbury	Stream, near Strong Road Cottages.	Whitish, and turbid, some sediment, lustre dull, taste flat, no smell.	Mineral grit, cotton and linen fibre, very small diatoms, no trace of animal life.	Trace	Large	None	

Table of Water Analyses.

Hardness. Degrees of Clark's Scale.		Chlorine, Grains per Gallon.	Ammonia, Parts per Million.		Solids, Grains per Gallon.		Oxygen required (determined by Permanganate of Potassium, Heat, and Sulphuric Acid), Parts per Million.		Nitrous Acid, Parts per Million.	Remarks.	No.
Total.	Fixed.		Free.	Albuminoid.	Total.	Fixed.	For Total Oxidizable Matter.	For Organic Matter only.			
7·20	4·55	3·8192	None	None	17·4000	14·9000	0·6600	0·5400	0·3450	Fit for use - -	1
3·85	2·80	2·3312	None	None	11·5500	10·5000	0·1400	0·0600	0·2300	Fit for use -	2
3·85	2·80	2·3312	None	None	11·5500	10·5000	0·1400	0·0600	0·2300	Fit for use - -	3
90	4·20	2·8272	None	None	13·3000	10·8500	0·3000	0·1400	0·4600	Fit for use - -	4
30	5·95	2·6288	None	None	15·7500	13·5000	0·2200	0·1400	0·2300	Fit for use - -	5
60	3·50	4·7120	0·2880	None	20·6500	16·1000	0·3000	0·2200	0·2300	Reaction suggests contamination with house refuse. Unfit for use.	6
20	2·45	1·9344	None	None	10·5000	8·7500	0·2200	0·1800	0·1150	Fit for use - -	7
35	2·10	3·1248	None	None	15·7500	13·3000	0·2600	0·1800	0·2300	Fit for use - -	8
45	3·75	3·9168	None	None	23·8000	18·5500	0·3000	0·2200	0·2300	Evidence of previous contamination. At present fit for use.	9
70	5·25	3·7200	0·1172	0·0560	19·6000	17·5000	0·1800	0·1400	0·1150	Usable - - -	10
80	4·20	1·6368	0·1400	0·1932	26·9500	25·2500	0·2000	0·1800	0·0575	Unfit for use - -	11
30	5·25	1·6368	None	0·0480	29·4000	28·3400	0·1800	0·0600	0·3450	Fit for use - -	12
00	4·37	1·8352	None	None	32·2000	28·7000	0·6600	0·6200	0·1150	Fit for use - -	13
35	7·00	1·7360	None	0·1104	19·9500	18·9000	0·3400	0·2600	0·2300	Usable - - -	14

No.	Station.	Source.	Physical Characters.	Microscopic Characters.	Qualitative Tests.			
					Oxidizable Matter indicated by Gold Chloride.	Nitric Acid.	Iron.	Sulphuretted Hydrogen.
15	Canterbury	Ditch end of culvert.	Whitish and turbid, dull, flat taste, no smell.	Very small Naviculæ, cotton and woollen fibres, amorphous matter, mineral grit.	Trace	Large	None	Trace
16	Fort Carlisle	Fort well, 86′ deep	Slightly yellow, no turbidity, small sediment, good lustre and taste, no smell.	Mineral grit, sand, particles of carbonate of lime, no trace of animal or vegetable life.	Trace	Slight	Trace	Trace
17	Caterham, Surrey.	Caterham Waterworks.	Very slightly yellow, very small sediment, good lustre and taste, no smell.	A few particles of mineral grit, a few crystals of carbonate of lime.	None	Trace	None	None
18	Caterham, Surrey.	Metropolitan District Asylum Supply.	Very slightly yellow, no turbidity, good lustre and taste, no smell, appreciable sediment.	Minute Amæbæ, vegetable débris, dyed woollen and cotton fibres, mineral grit, amorphous matter, Epithelium, Monadina, brown granular matter, Leptothrix Ochræa, micrococci.	Present	Large	Trace	Trace
19	Chattenden	Well - -	Clear, no turbidity, small sediment, very good lustre and taste, no smell.	Mineral grit and crystals of carbonate of lime.	None	Present	None	Present
20	Chobham -	Well, 12′ deep, near W. D. Warders' quarters.	Yellow, slightly turbid, large sediment, fair lustre and taste, no smell.	Spores of Fungi, several Acari, living and dead, epidermis of grass; ferruginous and amorphous matter.	Present	Large	Present	None
21	Clifton, York	Lunatic Asylum -	Slightly yellow, no turbidity, small sediment, good lustre, fair taste, no smell.	Epidermis of grass, brown matter, crystals of carbonate of lime, minute Amæbæ.	Trace	Present	None	Trace
22	Halifax -	Tank over Wellington Block.	Clear, no turbidity, small sediment, very good lustre and taste, no smell.	Vegetable debris, amorphous matter, mycelium and spores of Fungi, no trace of animal life.	Trace	Present	Trace	None
23	Halifax -	Station Hospital	Slightly yellow, no turbidity, very small sediment, good lustre and taste, no smell.	Sediment hardly appreciable, no trace of animal or vegetable life.	Trace	Small	None	None
24	Hoo Fort -	Artesian Well -	Slight turbidity, very large sediment, good lustre, flat taste, no smell.	Finely divided granular matter, ferruginous matter, no trace of life.	None	Present	Large	Large
25	Hythe - -	Pump at Fort Sutherland.	Yellow, turbid, large sediment, flat taste, no smell.	Minute Amæbæ, Monadina, spores, oscillatorians, bits of wood, fibres of clothing.	Present	Present	Trace	None
26	Hythe Fort	Well at married quarters, Rifle Range.	Yellow, large sediment, fair lustre, flat taste, no smell.	Mineral grit and ferruginous matter in small quantity, Amæbæ, Rotifer Vulgaris, Enchelys, Actinophrys, Aspidisca, Chœtonotis, brown granular matter, probably vegetable débris.	Trace	Large	Present	None
27	Hythe - -	Well on Rifle range.	Yellow, large turbidity and sediment, fair lustre and taste, no smell.	Mineral grit, a few minute Amæbæ, but no other trace of animal or vegetable life.	Present	Present	None	None
28	Isle of Wight, Parkhurst.	No. 1 Well, 240′ deep.	Slightly yellow, not turbid, some sediment, fair lustre and taste, no smell.	Amorphous granular matter, minute Amæbæ and Monadina.	Large	Very large.	None	Trace

Hardness. — Degrees of Clark's Scale.		Chlorine, Grains per Gallon.	Ammonia, Parts per Million.		Solids, Grains per Gallon.		Oxygen required (determined by Permanganate of Potassium, Heat, and Sulphuric Acid), Parts per Million.		Nitrous Acid, Parts per Million.	Remarks.	No.
[illegible]	Fixed.		Free.	Albuminoid.	Total.	Fixed.	For Total Oxidizable Matter.	For Organic Matter only.			
° [illegible]35	° 7·00	1·736	None	0·0918	17·8500	16·4500	0·5400	0·5000	0·1150	Fit for use - -	15
[illegible]95	11·55	4·8112	None	0·0332	39·9000	37·5000	0·2600	0·2600	None	Very hard, but fit for use.	16
[illegible]30	1·05	0·9425	None	None	10·1500	9·8000	0·1000	0·1000	None	Fit for use - -	17
[illegible]90	4·20	0·9424	None	0·0488	25·2000	22·0500	0·1000	0·1000	None	Microscopic examination unsatisfactory, filtration therefore advisable.	18
[illegible]50	25·65	5·5056	None	0·0780	65·4500	60·9000	0·4200	0·3800	0·1150	Organically pure, but hardness in very great excess.	19
[illegible]60	3·50	0·8432	0·1240	0·1136	11·9000	11·2000	1·2200	1·1000	0·3450	Usable after careful filtration.	20
[illegible]80	4·55	0·9424	None	0·0840	19·9500	19·2500	0·5400	0·1800	1·0350	Usable - - -	21
[illegible]45	1·92	0·5456	None	None	7·0000	6·3000	0·7000	0·6200	0·2300	Fit for use - -	22
[illegible]80	1·92	0·5456	None	None	7·7000	7·000	0·7000	0·6600	0·1150	Fit for use - -	23
[illegible]00	12·25	13·6400	0·1464	None	46·5500	45·5000	0·1800	0·1800	None	Organically pure, but an excess of chlorine and fixed hardness.	24
[illegible]85	1·05	2·2320	None	0·0960	17·8500	15·4000	0·6600	0·5400	0·3450	Filtration advisable as microscopic examination shows impurities.	25
[illegible]80	1·05	1·0416	0·1184	0·1752	18·9000	18·2000	0·5400	0·4600	0·2300	Unfit without careful filtration.	26
[illegible]80	1·05	1·0416	None	0·1608	20·3000	19·5500	0·5400	0·4600	0·2300	Unfit for use without filtration.	27
[illegible]55	5·95	9·9496	0·7000	0·1600	43·0500	38·5000	0·9000	0·7000	0·5750	Unfit for use - -	28

No.	Station.	Source.	Physical Characters.	Microscopic Characters.	Qualitative Tests.			
					Oxidizable Matter indicated by Gold Chloride.	Nitric Acid.	Iron.	Sulphuric Acid.
29	Parkhurst -	No. 2 Well, 242′ deep.	Slightly yellow, not turbid, small sediment, good lustre and taste, no smell.	Mineral grit, pine cells, brown amorphous matter, mycelium and spores of Fungi, Monadina, and crystals of carbonate of lime.	None	Present	Present	Trace
30	Parkhurst -	No. 3 Well, 250′ deep.	Slightly yellow and turbid, large sediment, fair lustre and taste, no smell.	Ferruginous matter, Chlorococcus cells, and black beaded Fungi.	Trace	Present	Large	Trace
31	Parkhurst -	No. 1, deep Well.	Very yellow, turbid, large sediment, fair lustre and taste, no smell.	Amorphous matter (dirt), a few Amœbæ and grit.	Present	Large	None	None
32	Sandown I. of Wight.	Sandown Water Company.	Yellowish, not turbid, small sediment, fair lustre and taste, no smell.	Mineral grit and a few mycelia and spores of Fungi.	Trace	Present	Trace	None
33	Landguard Fort.	Boring, 150′ deep	Yellow, great turbidity, large sediment, dull lustre, brackish taste, no smell.	Ferruginous matter and mineral grit, no trace of animal or vegetable life.	Trace	Large	Large	Very large
34	Landguard Fort.	Boring, 1¼ hours' pumping.	Yellow, great turbidity, large sediment, dull lustre, brackish taste, no smell.	Mineral grit and ferruginous matter in large quantity.	Trace	Large	Large	Very large
35	Landguard Fort.	Boring, 3¼ hours' pumping.	Yellow, great turbidity, some sediment, dull lustre, very salt taste, no smell.	Ferruginous matter and mineral grit.	Trace	Present	Large	Very large
36	Lichfield -	Reservoir and springs.	Slightly yellow, no turbidity, very small sediment, good lustre and taste, no smell.	Mineral grit and amorphous matter, mycelium and spores of Fungi	None	Present	Trace	Trace
37	Newcastle -	Rain water from the roofs of buildings.	Yellow and turbid, some sediment, fair lustre, flat taste, no smell.	Mineral grit, spores of Fungi, epidermis of grass, cotton fibre, amorphous matter.	Present	Large	None	Trace
38	Preston -	Fulwood Barracks	Slightly yellow, no turbidity, large sediment, good lustre and taste, no smell.	Monadina, Oscillatoria, Oxytricha, Astrionella, Cyclotella, Fragillaria, Navicula, amorphous matter.	Trace	Small	Trace	None
39	Shornecliffe	Rifle Range Well, Hythe.	Slightly yellow, not turbid, small sediment, good lustre, no smell.	Mineral grit, decaying vegetable matter, spores and mycelium of Fungi, fibres of linen, cotton, and wool, dyed wool, numerous Monadina, Actinophrys Sol, Oxytricha, Cyclops Quadricornis, living Enchelys.	None	Large	None	None
40	Shrewsbury	Not stated -	Slightly yellow, no turbidity, small sediment, very good lustre and taste, no smell.	Mineral grit, and amorphous matter, crystals of carbonate of lime, minute Monadina, &c.	None	Present	None	Trace
41	Towthorpe -	Artesian Well, 310′ deep.	Yellowish, slightly turbid, very large sediment, fair lustre and taste, no smell.	Ferruginous matter in large quantity, sand, grit, and amorphous deposit, minute Monadina.	Trace	Large	Large	Very large
42	Towthorpe -	Artesian Well -	Slightly yellow, not turbid, good lustre and taste, no smell.	Ferruginous matter, carbonate of lime, and minute monadina.	Trace	Large	Very large.	Very large

Hardness. Degrees of Clark's Scale.		Chlorine, Grains per Gallon.	Ammonia, Parts per Million.		Solids, Grains per Gallon.		Oxygen required (determined by Permanganate of Potassium, Heat, and Sulphuric Acid), Parts per Million.		Nitrous Acid, Parts per Million.	Remarks.
Total.	Fixed.		Free.	Albuminoid.	Total.	Fixed.	For Total Oxidizable Matter.	For Organic Matter only.		
6·00	1·75	4·0176	0·9240	None	28·7000	27·6500	0·3400	0·2600	0·2300	Free from active organic impurity. Fit for use.
39·80	2·80	5·3072	0·9360	0·0240	37·1000	36·0500	0·4200	0·3800	0·1150	Usable - -
11·90	1·75	11·5368	0·5112	0·0732	46·2000	45·8500	0·7400	0·5400	0·5750	Filtration advisable before use.
3·75	1·75	2·3312	None	0·1120	17·8500	17·1500	0·9400	0·7400	0·5750	Usable - -
57·00	57·00	228·0112	25·5200	0·1728	440·6500	406·0000	0·7000	0·7000	None	Unfit - -
51·51	51·51	228·0112	24·7000	0·1680	516·2296	495·2146	0·7000	0·7000	None	Unfit - -
58·90	58·90	228·0112	21·6000	0·1456	563·7546	503·6046	0·7000	0·7000	None	Unfit - -
4·55	4·55	0·9324	None	None	19·6000	16·1000	0·4200	0·3000	0·3450	Fit for use -
8·75	8·75	2·5296	11·2000	0·3600	20·6500	19·9500	1·5000	1·4000	0·2875	Unfit for use -
2·10	2·10	0·5436	None	None	7·0000	5·9500	1·0600	0·9400	0·3450	Fit for use -
0·70	0·70	0·4200	0·3336	None	15·4000	12·6000	0·4200	0·3400	0·2300	Well should be cleaned water usable.
8·05	8·05	0·7440	0·0708	0·0664	29·7500	27·3000	0·5000	0·4800	0·0575	Fixed hardness excessive, usable.
56·00	56·00	1·5968	0·3600	0·1000	123·2000	119·7000	0·8200	0·7000	0·3450	Unfit on account of great hardness and excess of magnesium salts.
57·75	57·75	1·8352	0·4144	None	136·8500	136·3000	1·0200	0·7800	0·6900	Unfit for use -

FILTER EXPERIMENTS—*continued.*

Constituents.	Spongy Iron, Large, No. 6.	Spongy Iron, Small, No. 1.	Original Water.	Remarks.
FIRST SERIES.				
Chlorine	1·4880	1·5872	1·5872	Tap water, to which was added a little sewage.
Total oxygen	0·7400	0·7800	2·2600	
Organic do.	0·6200	0·6600	1·9400	
Nitrous acid	0·3450	0·3450	0·9200	
Free ammonia	0·3472	0·3500	1·0920	
Albuminoid ammonia	0·0906	0·1024	0·3072	
SECOND SERIES.				
Chlorine	0·6448	0·6448	0·5456	Tap water; 1 grain sulphate of quinine was added to each gallon.
Total oxygen	0·3400	0·6600	3·2200	
Organic do.	0·1800	0·5000	2·7000	
Nitrous acid	0·4600	0·4600	1·4950	
Free ammonia	0·5952	0·3360	0·1072	
Albuminoid ammonia	0·0632	0·1080	0·8700	
THIRD SERIES.				
Chlorine	1·8352	2·0632	2·8272	Tap water, to which was added a solution of beef, made by adding water and dilute hydrochloric acid to finely cut meat.
Total oxygen	0·4200	0·7000	1·8600	
Organic do.	0·2600	0·4600	1·4200	
Nitrous acid	0·4600	0·6780	1·2650	
Free ammonia	0·4400	0·5972	0·1360	
Albuminoid ammonia	0·0600	0·3600*	0·8464	
FOURTH SERIES.				
Chlorine	1·5872	1·5872	1·3392	Beef soup which was slightly sour was added to tap water. The fat was not removed from the soup.
Total oxygen	0·3800	0·7800	2·4200	
Organic do.	0·2600	0·5800	1·8200	
Nitrous acid	0·3450	0·5750	1·7240	
Free ammonia	0·5760	1·0560	0·4548	
Albuminoid ammonia	0·1920	0·7280	2·5560	
FIFTH SERIES.				
Chlorine	1·3392	1·5872	1·3392	Tap water, rotten egg, and beef infusion, which was decomposed with a little sewage. The water was rendered decidedly offensive.
Total oxygen	0·9800	2·1400	5·5400	
Organic do.	0·5000	1·4200	3·3400	
Nitrous acid	1·3800	2·0700	6·3250	
Free ammonia	0·6528	0·5700†	0·2096	
Albuminoid ammonia	0·4756	1·2595†	3·5200	
SIXTH SERIES.				
Total oxygen	0·4200	This filter was stopped up; water passed freely through the aperture at the side, but not into the cistern. It was not analysed, as the time of contact was too short to give a good result. A brush was used, but the aperture was not made previous, and it could not be cleaned until filtering media were removed.	0·6200	1¼ cc. of albumen from a new-laid egg were added to 9 gallons of distilled water, and passed through filters.
Organic do.	0·3000		0·4200	
Nitrous acid	0·3450		0·5750	
Free ammonia	0·3584		0·0920	
Albuminoid ammonia	0·1480		0·3300	

* Retort dirty. Result not accepted.
† Mean of two experiments.

Constituents.	Spongy Iron, Large, No. 6.	Spongy Iron, Small, No. 0.	Original Water.	Remarks.
SEVENTH SERIES.				
Chlorine - -	—	—	—	Twenty gallons of tap water, into which one gallon of strong stable sewage was put, also a small cupful of rotten egg, and a little fresh fæces. A portion was passed through each filter. Twenty gallons of tap water were next passed through, and the last gallon examined as before. The object is to ascertain the durability of the filtering media.
Total oxygen - -	0·9000	—	0·8200	
Organic do. - -	0·7000	—	0·8200	
Nitrous acid - -	0·5750	—	None.	
Free ammonia - -	5·7550	—	None.	
Albuminoid ammonia	0·1600	—	0·1024	

FILTER EXPERIMENTS—*continued.*

Constituents.	Animal Charcoal (best).	Silicated Carbon Co.'s Filter.	Original Water.	Results, &c.
FIRST SERIES.				
Total oxygen - -	0·6600	0·5800	1·5400	Tap water, with a small portion of stable sewage added.
Organic do. - -	0·5400	0·3800	1·3000	
Nitrous acid - -	0·3450	0·5750	0·6900	
Free ammonia - -	0·5568	0·4480	0·7468	
Albuminoid ammonia	0·1900	0·1328	0·2340	
SECOND SERIES.				
Total oxygen - -	0·2600	0·1800	1·5400	Distilled water. One grain sulphate of quinine to each gallon.
Organic do. - -	0·1000	0·1400	1·2200	
Nitrous acid - -	0·4600	0·1150	0·9200	
Free ammonia - -	0·0804	0·0504	0·0504	
Albuminoid ammonia	0·0976	0·1340	0·6240	
THIRD SERIES. Not done.				
FOURTH SERIES.				
Total oxygen - -	2·3000	1·0200	3·7800	Tap water, to which was added some sour soup from which the fat was not removed.
Organic do. - -	1·7400	0·7000	2·6600	
Nitrous acid - -	1·6100	0·9200	3·2200	
Free ammonia - -	2·3600	0·9600	4·4160	
Albuminoid ammonia	4·3200	1·8200	6·0400	
FIFTH SERIES. Not done.				
SIXTH SERIES.				
Total oxygen - -	0·9000	0·3800	1·3000	3 ccs. fresh albumen added to 10 gallons of distilled water. N.B.—The distilled water was obtained from a chemist, our still being out of repair. It was *not* pure. This accounts for the presence of nitrous in these two series.
Organic do. - -	0·4200	0·1800	0·5000	
Nitrous acid - -	1·3800	0·5750	2·3000	
Free ammonia - -	Nil.	Nil.	Nil.	
Albuminoid ammonia	0·5056	0·1536	0·7680	
SEVENTH SERIES. Not done.				

FILTER EXPERIMENTS.—DIMINUTION PER CENT.

Constituents.	Crease's Carferal, Fine.	Crease's Carferal, Coarse.	Spongy Iron, Large.	Spongy Iron, Small.	Animal Charcoal (best).	Silicated Carbon Co.'s Filter.
FIRST SERIES.						
Chlorine	Nil.	− 5	− 6	Nil.	Not determined.	
Total oxygen	− 69·0	− 65	− 67	− 66	− 57	− 62
Organic do.	− 77·0	− 59	− 68	− 64	− 59	− 71
Nitrous acid	− 42·0	− 83	− 63	− 63	− 65	− 41
Free ammonia	−100·0	− 94	− 68	− 68	− 39	− 40
Albuminoid ammonia	−100·0	− 91	− 71	− 67	− 33	− 53
Total of organic oxygen and albuminoid ammonia	−177	−151	−139	−131	− 92	−124
Mean	− 88	− 75	− 69	− 65	− 46	− 62
SECOND SERIES.						
Chlorine	+ 18	+ 18	+ 18	+ 18	Not determined.	
Total oxygen	− 86	− 87	− 89	− 80	− 83	− 88
Organic do.	− 86	− 86	− 93	− 82	− 92	− 87
Nitrous acid	− 85	− 92	− 69	− 69	+ 40	− 88
Free ammonia	−100	− 35	+455	+214	+ 60	Nil.
Albuminoid ammonia	− 92	− 90	− 93	− 88	− 84	− 78
Total of organic oxygen and albuminoid ammonia	−178	−176	−186	−170	−176	−165
Mean	− 89	− 88	− 93	− 85	− 88	− 82
THIRD SERIES.						
Chlorine	− 21	− 11	− 35	− 26	Not done.	Not done.
Total oxygen	− 76	− 69	− 77	− 62		
Organic do.	− 77	− 82	− 82	− 68		
Nitrous acid	− 74	− 52	− 64	− 46		
Free ammonia	+ 20	+ 20	+224	+340		
Albuminoid ammonia	− 95	− 89	− 93	− 57		
Total of organic oxygen and albuminoid ammonia	−172	−171	−175	−125	—	—
Mean	− 86	− 85	− 87	− 62	—	—
FOURTH SERIES.						
Chlorine	Nil.	+ 19	+ 19	+ 19	Not determined.	
Total oxygen	− 85	− 73	− 84	− 68	− 39	− 73
Organic do.	− 86	− 84	− 86	− 68	− 34	− 73
Nitrous acid	− 82	− 27	− 80	− 67	− 50	− 72
Free ammonia	− 89	− 74	+ 26	+131	− 46	− 78
Albuminoid ammonia	− 95	− 90	− 93	− 71	− 28	− 70
Total of organic oxygen and albuminoid ammonia	−181	−170	−179	−139	− 62	−143
Mean	− 95	− 85	− 89	− 69	− 31	− 71
FIFTH SERIES.						
Chlorine	− 14	− 14	Nil.	+ 20	Not determined.	Not determined.
Total oxygen	− 94	− 89	− 82	− 61		
Organic do.	− 94	− 93	− 85	− 58		
Nitrous acid	− 93	− 83	− 76	− 64		
Free ammonia	− 45	− 24	+ 31	+ 27		
Albuminoid ammonia	− 98	− 92	− 67	− 64		
Total of organic oxygen and albuminoid ammonia	−192	−185	−152	−122	—	—
Mean	− 96	− 92	− 76	− 61	—	—

Constituents.	Crease's Carferal, Fine.	Crease's Carferal, Coarse.	Spongy Iron, Large.	Spongy Iron, Small.	Animal Charcoal (best).	Silicated Carbon Co.'s Filter.
Sixth Series.						
Chlorine	Not determined.					
Total oxygen	− 58	− 45	− 32	Filter choked up.	− 31	− 71
Organic do.	− 38	− 29	− 28		− 16	− 64
Nitrous acid	−100	− 80	− 41		− 40	− 75
Free ammonia	−100	− 15	+300		Nil.	Nil.
Albuminoid ammonia	− 75	− 55	− 55		− 55	− 80
Total of organic oxygen and albuminoid ammonia	−113	− 84	− 83	—	− 51	−144
Mean	− 56	− 42	− 41	—	− 25	− 72

Constituents.	Crease's Carferal, Fine.	Crease's Carferal, Coarse.	Spongy Iron, Large (No. 6).	Spongy Iron, Small (No. 1).
Seventh Series.				
Chlorine	Not determined.			
Total oxygen	+ 11	+ 11	+ 11	Filter choked.
Organic do.	− 28	− 23	− 14	
Nitrous acid	+20	+20	+20	
Free ammonia	+20	+20	+20	
Albuminoid ammonia	+154	+115	+ 56	
Total of organic oxygen and albuminoid ammonia	+126	+ 92	+ 42	—
Mean	+ 63	+ 46	+ 21	—

The results are as follows :—

1. The chlorine has hardly been altered to any material extent, except in the 3rd series by the spongy iron filter. This is a point that is quite unimportant.
2. The organic matter, as indicated by the oxygen required for its destruction, and by the albuminoid ammonia found, was largely diminished by all the filters, but least of all by the loose animal charcoal, a result rather unexpected when compared with that of former experiments. The sample of charcoal was understood to be the best commercial article in the market.
3. The intermediate products, viz., the free (or saline) ammonia and the nitrous acid were affected as follows :—
   a. The carferal and silicated carbon removed a considerable quantity of the free ammonia in all cases, except the final series, in which the silicated carbon was not tested.
   b. The spongy iron *increased* the free ammonia in all except the first series.
   c. The nitrous acid was diminished throughout, except in the 2nd series, where it was slightly increased in the case of the charcoal.

Throughout the experiments the superiority lay with the carferal and the large spongy iron filter, except in No. 6 (experiment with fresh albumen) in which the silicated was rather the best. The small spongy iron filter was hardly adapted to stand so severe a trial as the large one was exposed to. The real object of the experiments was a comparison between the carferal and the large spongy iron filter.

Appended is a table, showing the order of merit in the various groups of series, with reference to the diminution of organic matter as shown by the oxygen and albuminoid ammonia columns. It will there be seen that the carferal, spongy iron, and silicated carbon all proved themselves good filters, the balance being rather in favour of the two former, and that the finely triturated carferal proved more efficacious than the coarser form.

ORDER of MERIT of the different FILTERING MEDIA.

I.—*Oxygen required for Organic Matter, Diminution per cent.*

1st.—1st, 2nd, and 4th series, in which all the media were tried :—

1. Carferal (fine) - - - - - 83
2. „ (coarse) - - - - - 82
3. Silicated carbon - - - - - 77
4. Spongy iron (large filter) - - - - 76
5. „ (small filter) - - - - 71
6. Animal charcoal - - - - - 62
(Commercial in fragments.)

2nd.—1st, 2nd, 4th, and 6th series, in which all were tried except the *small* spongy iron filter :—

1. Silicated carbon - - - - - 74
2. Carferal (fine) - - - - - 72
3. Spongy iron (large filter) - - - - 69
4. Carferal (coarse) - - - - - 64
5. Animal charcoal - - - - - 50

3rd.—1st, 2nd, 3rd, 4th, and 5th series, in which the carferal and spongy iron were tried :—

1. Carferal (fine) - - - - - 84
2. Spongy iron (large filter) - - - - 83
3. Carferal (coarse) - - - - - 81
4. Spongy iron (small filter) - - - - 68

4th.—1st to 6th series, in which carferal, coarse and fine, and the *large* spongy iron filter were tried :—

1. Carferal (fine) - - - - - 76
2. Spongy iron (large filter) - - - - 74
3. Carferal (coarse) - - - - - 72

5th.—1st to 7th series, in which carferal and spongy iron were tried, as in No. 5 :—

1. Carferal (fine) - - - - - 67
2. (equal) { Carferal (coarse) - - - - - 65
{ Spongy iron (large filter) - - - 65

II.—*Albuminoid Ammonia, Diminution per cent.*

1st.—1st, 2nd, and 4th series in which all the media were tried :—

1. Carferal (fine) - - - - - 96
2. „ (coarse) - - - - - 90
3. Spongy iron (large filter) - - - - 86
4. „ (small filter) - - - - 75
5. Silicated carbon - - - - - 67
6. Animal charcoal - - - - - 48

2nd.—1st, 2nd, 4th, and 6th series in which all except the small spongy iron were tried :—

1. Carferal (fine) - - - - - 90
2. „ (coarse) - - - - - 81
3. Spongy iron (large filter) - - - - 78
4. Silicated carbon - - - - - 70
5. Animal charcoal - - - - - 45

3rd.—1st to 5th series, carferal and spongy iron :—

1. Carferal (fine) - - - - - 96
2. „ (coarse) - - - - - 90
3. Spongy iron (large filter) - - - - 83
4. „ (small filter) - - - - 69

4th.—1st to 6th series, carferal and large spongy iron filter :—

1. Carferal (fine) - - - - - 92
2. „ (coarse) - - - - - 84
3. Spongy iron - - - - - - 79

5th.—1st to 7th series, carferal and large spongy iron:—

1. Spongy iron - - - - - - 59
2. Carferal (fine) - - - - - 57
3. „ (coarse) - - - - - 56

III.—*Oxygen for Organic Matter and Albuminoid Ammonia taken together, Diminution per cent.*

1st.—1st, 2nd, and 4th series, in which all were tried:—

1. Carferal (fine) - - - - - 89
2. „ (coarse) - - - - - 86
3. Spongy iron (large filter) - - - - 84
4. „ (small filter) - - - - 73
5. Silicated carbon - - - - - 72
6. Animal charcoal - - - - - 55

2nd.—1st, 2nd, 4th, and 6th series, in which all were tried except small spongy iron:—

1. Carferal (fine) - - - - - 81
2. Spongy iron - - - - - - 73
3. (equal) { Carferal coarse - - - - - 72 / Silicated carbon - - - - - 72
5. Animal charcoal - - - - - 47

3rd.—1st to 5th series, carferal and spongy iron:—

1. Carferal (fine) - - - - - 90
2. „ (coarse) - - - - - 85
3. Spongy iron (large filter) - - - - 83
4. „ (small filter) - - - - 68

4th.—1st to 6th series, carferal and large spongy iron filter:—

1. Carferal (fine) - - - - - 84
2. „ (coarse) - - - - - 78
3. Spongy iron - - - - - - 76

5th.—1st to 7th series, carferal and large spongy iron filter:—

1. { Carferal (fine) - - - - - 62 / Spongy iron - - - - - 62
3. Carferal (coarse) - - - - - 60

The filtering power being thus good in all, the question of convenience comes to be considered. We may conclude as follows:—

1. *Rapidity of Action.*—Here the carferal has the advantage, for it is very rapid and requires no reservoir. On the other hand, the spongy iron and silicated carbon are slow, and require reservoirs in the filters.
2. *Continuity of Action.*—Here the silicated carbon is the least advantageous, as it tends to clog somewhat early with bad waters and requires attending to. The spongy iron has also some tendency in this way, but generally this may be easily and quickly remedied.
3. *Effects in stored Water.*—Here the carferal seems to be equal to the spongy iron in yielding nothing to the water that tends to injure by the propagation of organisms. This effect, on the other hand, is observable in the case of the silicated carbon, although less so than with loose animal charcoal.
4. Carferal has the advantage over spongy iron in that it is *all* filtering material, whereas part of the filter where spongy iron is used is occupied by a second medium, intended to arrest the iron yielded to the water.
5. Carferal does not spoil in any way by being stored, even if exposed to wet it does not appear to be materially injured.

Putting aside the silicated carbon, as being unsuitable for general service purposes, it would appear that (so far as our experiments have yet gone) carferal is the preferable substance to use, and that it is peculiarly adapted for use in Major Crease's filters. Further experiments are being carried on on this subject.

2. *Air, ventilation, &c.*—The paper by Dr. Cowles and Dr. Wood, in the Tenth Annual Report of the State Board of Health of Massachusetts, "A "Contribution to the Study of Ventilation," is one of the most important that has appeared lately. The experiments have been carried on with care and labour, especially as regards the velocity, direction, and temperature of air currents in wards. They were done in the Boston City Hospital, and elaborate diagrams of the results are furnished. Two or three points of importance appear from the recorded results, among which are the temperature of the wards, the influence of the temperature of the incoming current on its direction, the course of the air at different heights, and the humidity. The method of ventilation may be stated generally as the introduction of warmed fresh air below, and the extraction of the foul air by openings in the arched ceiling of the ward, passing to a heated ventilating chamber, and thence to the open air. Arrangements are made for controlling and modifying the currents in accordance with seasonal changes. The range of temperature outside (month of December 1878) was from 18° F. to 49° F., and the humidity from 31 per cent. to saturation. The floor space per bed was 88·45 square feet, cubic space 1,629 cubic feet, equal to 1,061, with 12 feet of height; height of ward to centre of arched roof, 20 feet; mean height, 18·42 feet; length, 94 by 26½; 7 opposite windows and 14 beds on each side. The experiments showed a free and ample change of air, more than 9,000 cubic feet per bed per hour being actually registered by the air meters, and an amount of air actually utilised, as calculated by the respiratory impurity, equal to from 3,000 to 4,500. This is a very satisfactory result, considering that it was accomplished with a minimum of space, 88 square feet of floor space being about the smallest amount admissible for a ward, taking everything into consideration. *Temperature of the wards*:—This seems to have ranged from 64° F. to 68° F. at the floor in the centre; from 68° F. to 70° F. at the bed heads; from 66° F. to 75° F. at 6 feet from the floor; and from 73° to 80° at the ceiling. The mean temperature was therefore not far short of 70° F. This we should consider too high in general in this country. I found (in my own experiments) the mean of the best ventilated air spaces to be about 63° F., and I do not think it ought to exceed 65° F. although, of course, with a free and constant change of air, any evil effects of a higher temperature would be much lessened. I feel convinced, that for surgical wards, a temperature of 60° F. is sufficient. The temperature (in the Boston experiments) in the ventilating chamber above the ceiling was purposely kept high, sometimes as high as 88° F., in order to favour the uptake. The temperature of the incoming current is recorded as from 90° to 98°; this seems a little high, and practically inconvenience was found from the higher temperatures, because the air was not equally diffused, and the conclusion come to (p. 238) is that "to gain the "best diffusion of fresh air, its temperature should not be above 90° F., and "its velocity 180 feet per minute, or somewhat less." This is a conclusion of great importance in practice, and may be recommended to the attention of all who have to deal with the important subject of ventilation. *Course of the air at different heights.*—This was determined by developing vapour of ammonium chloride at different levels, and noting the direction. Carefully drawn diagrams show the results, indicating, both by vertical and horizontal sections, the more or less perfect diffusion in the different strata of air. At the floor level and 3 feet above the movements are very complicated, being both freely lateral and upward; at 6 feet the upward movement distinctly predominates; and at 9 feet the lateral movement is very much diminished; at 12 feet the lateral movement has almost entirely disappeared, and above that height what remains of it is apparently due solely to the fact that the point of exit is at the centre, to which the currents from various quarters are tending. This has a most important bearing on the height of wards and buildings generally. We may farther note that the amount of carbonic acid differed materially at the different levels. Thus, at 2 feet from the floor in the centre the respiratory impurity was (per 1,000 vols.) 0·122; between the beds at the same level, 0·136; at 12 feet from the floor in the centre of the ward, 0·20; and at the side at the same level, 0·254; an increase at the higher level of 65 per cent., and 87 per cent. respectively. Now, if there ceases to be active diffusion, and if an upward current is definitively established at the height of 12 feet, what, I venture to ask, is the necessity for carrying the height above this? It seems to me

that we only increase expense of construction, the difficulty of ventilation, and the cost of warming. We also simply collect a fouler atmosphere, which may, by a back current, be driven down again, but which ought simply to be removed as rapidly as possible. In a building for temporary occupation, that is, a couple of hours or so at any time, one can understand the object of considerable height, seeing that adequate lateral space is often impracticable; but in buildings for permanent occupation nothing is to be gained, except, perhaps, in appearance, whilst something may be lost in more directions than one. *Humidity of wards*:—In the Boston experiments the relative humidity was very low. In some of the observations it is stated at only 15 per cent. I cannot, however, reconcile the calculations with the temperatures, for when 15 per cent. is given, the dry and wet bulb temperatures are given respectively as 71° and 51°; now from Glaisher's tables these give 28 per cent. relative humidity. Again the means of one day's observations are given as, dry 70°, wet 52°, dew point 28°; but the dew point is really 38°·1, and the humidity 31 instead of 21. Even working out the result by Apjohn's formula, the dew point becomes 32·8, and the humidity 27. Whichever result, however, we take, we find a very great degree of dryness, an amount, in fact, to which we are in the habit of attributing some degree of discomfort in this country, and probable injury to health. Dr. Cowles, however, states that nothing of the kind has been observed, and, although this view is not shared by his countryman, Mr. Robert Briggs, of Philadelphia (Journal of the Franklin Institute, 1878), yet it is corroborated by the observations and opinion of Dr. John S. Billings (report on the heating and ventilation of the Johns Hopkins Hospital), who thinks that the discomfort in such cases is due more to the insufficiency of fresh air than to mere dryness, and he cites the dry warm climate of Arizona as an instance when no discomfort is felt. This may be so, but it is still an acknowledged fact, in this country, that dry air, beyond a certain point, produces discomfort, which may be relieved by moistening it. At the same time, it is probable that in laying down rules for this point, we shall have to make considerable allowance for differences of climate, which render any inflexible rule inapplicable. There is probably less danger from a dry atmosphere in a ward in a naturally dry climate, than there would be in a climate like ours. On the other hand it is not unlikely that, *ceteris paribus*, an excess in the direction of dryness is less dangerous to health than an excessive humidity, looking to the fact that the latter favours, whilst the former retards organic reproduction. Certainly the most important point is the efficient renewal of air, whatever be the condition as regards humidity. I should still adhere, however, to the rules usually adopted for this and similar climates, viz., to preserve a degree of humidity of about 73 per cent., allowing considerable latitude for other countries, where the climatic conditions differed materially.

Another interesting paper on this subject is that by Mr. W. W. Phipson, C.E., on the heating and ventilating apparatus of the Glasgow University, Proceedings of the Institution of Civil Engineers, 1878–9, vol. lv., part I.

Whilst on the subject of ventilation, I may call attention to a phase of the question which seems not unattended with danger; this is a tendency to curtail cubic space and diminish ventilation, as being less necessary, where the antiseptic treatment is in use. The plea advanced is, that by this treatment, surgical diseases may be prevented, and it has even been proposed to apply the same principle to puerperal cases. We may admit the full value of the antiseptic method, which has undoubtedly enabled hospitals to get rid of surgical and hospital diseases (so called), without having had resort to other sanitary measures; but, because this has been the case, to propose to return to old conditions of insufficient space and limited ventilation would, in my opinion, be a most dangerous retrogression. We may prevent surgical disease, but we cannot prevent the access of foul air to the lungs, which no disinfection is capable of protecting. If, however, the principle of overcrowding be once admitted in surgical wards, it will be difficult to combat it in medical; and should this be one outcome of the antiseptic system, it will not be unfraught with evil, great as have been the blessings attending its introduction.

3. *Food and beverages.*—Several samples of food have been submitted for analysis at Netley. The following table gives abstracts of some of these:—

No.	Name.	Physical Characters.	Moisture.	Dry Meat.	Nitrogen.	Ash.	Chlorine in Ash.	Alkalinity of Ash, as Potash.	Phosphoric Acid.	Fat.
			Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
1	Edward's Desiccated Soup.	Sold in small boxes; the meat consists of small brownish grains, very fine and coarse, mixed.	8·2760	91·7240	3·0600	6·2300	0·1420	0·7392	1·2200	—
2	Valentine's Meat Juice.	A dark fluid liquid; sold in bottles about 2 oz. in each; rather agreeable taste.	51·3870	48·6130	2·7690	12·8399	1·8242	2·4664	3·3000	—
3	Wilson's Packing Co.'s celebrated Compressed Corned Beef; sold in tins.	A solid mass of meat; fair quantity of fat and jelly surrounding it.	41·7500	58·2500	8·7812	5·0600	3·2467	0·1048	0·315	15·9350
4	Meat Farina, by W. Miller & Co., London.	A light brown powder, which made into soup is palatable.	4·3000	95·7000	5·4600	3·844	—	—	—	12·593

No. 3, the compressed corned beef forms an excellent ration.

In addition to the above, a form of meat biscuit was proposed for the field by Messrs. Spratt; it was of flat quadrangular shape, well baked, a good deal broken, colour grey inside with dark spots, palatable when eaten. Under the microscope it showed wheaten flour with some meat fibre; the latter, however, seemed to have been submitted to an excessive drying process, as the striae were nearly obliterated, and the fracture vitreous. Even after maceration for several days they did not appear to be capable of reabsorbing water; nor did glacial acetic acid bring out the striae as it usually does; the particles remained hard and incompressible. Even after four days' digestion in dilute hydrochloric acid no appreciable change appeared to be accomplished, the edges of the fractures remaining sharply defined.

The following is the chemical analysis, compared with that of ordinary ration biscuit:—

Constituent.	Meat Biscuit. Per cent.	Ordinary Biscuit (average). Per cent.
Water	9·452	8·0
Albuminate	15·536	15·6
Fat	3·827	1·3
Carbo-hydrate	69·065	73·4
Ash	2·120	1·7
Total	100·000	100·0
Nitrogen	2·465	2·475
„ grains in one ounce	10·72	10·76
Carbon (per ounce):		
In albuminates	36·2	36·3
„ fats	13·3	4·5
„ carbo-hydrates	134·0	142·0
Total	183·5	182·8

Potential energy (per ounce):					
In albuminates -	-	27·05	-	-	27·15
„ fats - -	-	14·46	-	-	4·92
„ carbo-hydrates -	-	93·10	-	-	99·00
Total -	-	134·61	-	-	131·07

As a single ration, 30 ounces would be required to provide the requisite nitrogen, assuming that everything was assimitable, but even then the fat and the salts would be deficient. Looking, however, to the intractable form of the meat fibre, as shown by the microscopic examination, and to the further fact that there is practically but little difference in the biscuit from ordinary biscuit, so far as chemical constituents are concerned, it seems unadvisable to recommend its use as a ration.

With reference to the question of nutrition, an important paper has been published in the last report of the Sanitary Commissioners with the Government of India, by D. D. Cunningham, M.B., Special Assistant to the Sanitary Commissioner with the Government of India, "On certain effects of Starvation on Vegetable and Animal Tissues." The author points out that the effects of starvation on vegetable tissues, as instanced by experiments on *Choanephora* and *Pilobolus Crystallinus*, are, fatty degeneration and altered fructification. "The primary effect seems to consist in a gradual analysis of "the complex amalgam, constituting the protoplasm, and of a precipita-"tion of oily matter from it. This is followed by transformation affecting "the albuminoid constituents, and ultimately leading to their more or less com-"plete conversion into fat. . . . . In germinating spores, we find a solution "and disappearance of differentiated oily matter; in starved filaments, a "precipitation of oily matter from a previously homogeneous protoplasm" (pp. 12 and 13). In animals (as shown by experiments in *Bufo Melanostictos* and *Rana Tigrina*) the effects are a similar degeneration, affecting the tissues generally, but very marked in the destruction of the epithelium and the blood globules. In the autopsies made in cases of death from famine at the Monegar Choultry Relief Camp in Madras, in May and June 1877, the general results were, an extreme anæmia, a great diminution in the size of the spleen, and a degeneration and softening of the mucous membrane of the intestines. The diarrhœa and so-called dysentery occurred without true dysenteric processes, although these might supervene at a later period. There is a great diminution in the actual mass of the blood, and the degeneration of the tissues is fatty and destructive, and not mere atrophic diminution of bulk, as affirmed by Bauer. The conclusion arrived at is that the so-called "famine diarrhœa" and "famine dysentery" are really special diseases due to destructive effects of deficient nutrition, especially the degeneration and destruction of the epithelial and glandular elements of the mucous membrane of the digestive system. The food elements not being submitted to their normal transformations, become mere foreign bodies liable to undergo decomposition, and well adapted to cause irritation, especially on surfaces which have been more or less denuded of their normal protective coverings, as is the case with the intestinal mucous membrane after the destruction of its epithelium. This explains the onset of the symptoms in the relief camps, when larger quantities of food are supplied, whilst the digestive and absorptive apparatus is insufficient to deal with it. This points to the necessity of great caution, both in dietetic experiments and in dietetic punishments. "The "insidious character of the mischief," says the author in conclusion, "has a "most important bearing on the practical question of the management of "famines. Due to it, relief camps may be, and are to a great extent, "rendered useless by the people failing to have recourse to them, until it is too "late. They, too, are likely to be deluded by the idea that, where no active "symptoms have appeared, no permanent damage has been done, and that "they may safely delay until their distress has counterbalanced their natural "inertness and dislike of disturbing their ordinary habits."

The phenomena of altered fructification in vegetable organisms are very interesting, it being shown that conidia either germinated very imperfectly, or refused to germinate at all in an innutritous medium. On the other hand sporangial fructification was generally indicative of starvation. This double

kind of fructification, controlled by the surroundings has obviously an important bearing on the question of disease propagation on the basis of the germ theory, and may tend to explain some phenomena which are at present very perplexing.

Beverages, Alcoholic.—The accompanying table gives the particulars of five samples of wine and three of spirits.

ALCOHOLIC BEVERAGES.

No.	Name.	Physical Characters.	Sp. Gr. at 60° F.	Alcohol, Vol. in Vol.	Solids.	Acidity—Grains per Ounce.			Remarks.
						Total as Tartaric Acid.	Fixed as Tartaric Acid.	Volatile as Acetic Acid.	
					Per cent.				
1	Sherry	A light pleasant wine; straw coloured. Slightly turbid; free from any acid taste.	·989	16·50	2·50	2·3209	2·2590	1·9786	Fairly good.
2	Sherry	Slightly cloudy; taste of sherry, but sweet; slight smell of sherry.	·992	20·00	3·50	3·2300	2·7600	0·2100	Too sweet; per cent. of sugar as glucose =2·2128; also too much fortified; unfit for hospital use.
3	Sherry	Clear; straw colour; smell and taste very agreeable; very good flavour.	·996	18·00	4·50	2·0250	2·3953	0·1837	Fairly good; sugar = 1·9600 per cent. as glucose.
4	Claret	Clear; very good flavour and agreeable; smell fragrant.	·9949	11·50	2·75	2·3875	2·5244	0·2387	Very good wine; fit for hospital use.
5	Claret	Clear; well-flavoured; smell and taste of claret, but not so agreeable a bouquet as previous sample.	·9945	12·00	2·70	3·1171	2·7234	0·3150	A sound wine, of fairly good quality; fit for hospital use.
6	Whiskey (Irish).	Clear; straw coloured; smell and taste of whiskey, and odour resembling pine wood; flavour mild and not strong.	·9201	48·50	0·3000	—	—	—	Weak; appears to be adulterated with water.
7	Rum	Sample was 100½ ccs. of a brownish yellow spirit, with some smell of rum, but rather an unpleasant odour.	0·9515	34·36	0·2000	—	—	—	Weak; water and essential oils added.
8	Rum	Sample was 53 ccs. of a light brown liquid, of a sickly odour; dark particles floating in it.	0·9601	29·75	0·4000	—	—	—	Weak; water, essential oils, and tobacco added.

The wines have probably all been more or less fortified, either by brandy in the case of the sherry, or perhaps by mixing with strong white wine in the case of the claret.

The samples of spirits are interesting. The first is an ordinary example of Irish whiskey, to which flavour is imparted by means of pine or oak sawdust. It would have been considered weak according to what used to be held as the standard of Excise, but recent legislation (Adulteration of Food and Drugs Amendment Act, 1879,) allows a latitude in the strength of spirits to the following extent:—

For brandy, whiskey or rum, 25 degrees under proof. This is equal to 42·6 per cent. of absolute alcohol, volume in volume, or to 34·1 per cent. of weight in volume.

For gin, 35 degrees under proof. This is equal to 36·9 per cent of absolute alcohol, volume in volume, or to 29·5 per cent. of weight in volume.

Proof spirit itself being equal to 56·8 volume in volume, or to 45·4 weight in volume of absolute alcohol.

Accordingly the above sample (No. 6 in table) must be considered as above the minimum strength.

The two samples of rum (Nos. 7 and 8) were sent for examination as it was considered that the effects upon the men were of an unusually stupifying kind. Both were from village public-houses. It was certainly not their strength that produced the effect, for the one was 8 per cent. and the other 12·8 below the minimum. They had therefore been weakened respectively by the addition of 22 and 30 per cent. of water. No. 7 was flavoured with oil of aniseed, but nothing else was detected. No. 8 was flavoured with oil of cloves, and in addition there was an appreciable amount of *nicotine;* the suspended particles were tobacco. Of course it is impossible to say whether its introduction was accidental or not, but this is the first instance in which I have myself been able to detect tobacco in a sample of spirits (or indeed in any sample of liquor), although it is said to be not infrequently introduced.

Non-alcoholic. Tea.—The hospital at Netley being no longer supplied by a contractor, samples of tea have not been submitted for analysis.

4. *Poisonous Wall-papers.*—These have excited attention lately, and a sample was sent to me from the Royal Barracks in Dublin, where it had formed the covering of the walls of an officer's quarters. It was an ordinary paper, with a grey and white ground and a sparse flower pattern in blue, a paper very common formerly, although now out of use. In appearance it would not have suggested the presence of arsenic, and I was therefore more than usually careful in its examination, repeating the analysis several times with every possible precaution. The result was that the paper contained 0·194 of a grain of arsenious acid in one square foot. At this rate an ordinarily sized room would contain between 70 and 80 grains of arsenic. Such an amount would be quite sufficient to produce poisonous symptoms in many persons.

5. *Disinfectants and Deodorants.*—The following are the results of the experiments carried out by Surgeon-Major J. Lane Notter in our laboratory at the Army Medical School.

Experiments on Disinfectants.

Experiment 1.

For this purpose a piece of fresh beef was steeped in water, and permitted to pass into decomposition for the development of bacteria. In another vessel some linseed meal was mixed with water and allowed to stand by for some time, but with a more tardy evolution of bacteria.

The activity of the bacteria in these infusions being known by previous microscopic observation, it was proposed to submit them to a given quantity of each of the various agents, and again observe the effect under the microscope.

5ccs. of a 10 per cent. solution of—

1. Carbolic acid crystals
2. Carbolic acid
3. Chloride of lime
4. Chloralum liquid
5. Condy's fluid
6. Universal disinfectant powder
7. Terebene liquid
8. Terebene powder, green
9. Terebene powder, yellow
10. Sanitas
11. McDougall's disinfecting fluid
12. Phenyl
13. Burnett's solution
14. Eureka
15. Sporokton

Were added to 10 ccs. of beef infusion, swarming with bacteria, having been kept for nearly 3 weeks.

Immediate Examination.

Agent used.	Results.
1. Carbolic acid crystals	Bacteria living but rather sluggish in their movements. Equally distributed in the field.
2. Carbolic acid -	Same as No. 1.
3. Chloride of lime -	Bacteria nearly altogether precipitated in filmy undissolved clouds of the disinfectant. No movements observable in the intervening spaces of the field.
4. Chloralum - -	Bacteria largely precipitated in a cloudy deposit at the bottom of the vessel, some few remaining in the free state with evident, but very feeble movement.
5. Condy's fluid -	Vibriones, spirilla, and other bacteria in active motion, and equally distributed in the field.
6. Universal disinfectant powder.	Bacteria quite free, but with much diminished activity. Two or three very active monads were however, also observed.
7. Terebene liquid -	Bacteria still very active.
8. Terebene powder, green.	Activity much diminished.
9. Terebene powder, yellow.	Same as No. 8.
10. Sanitas - -	Still very active, many excursive.
11. McDougall's disinfecting fluid.	Activity diminished. Bacteria equally distributed in the field.
12. Phenyl - -	Activity very much diminished, none excursive. The flocculi appeared to consist of bacteria, studded with extremely minute refracting particles, probably micrococci.
13. Burnett's fluid -	Activity very much diminished, none excursive.
14. Eureka - -	Odour not diminished. Bacteria very active when in a free state. Here and there in zooglæa form. No attempt at precipitation, none excursive.
15. Sporokton - -	Odour undiminished. Bacteria free and very active, a few excursive. Vibriones and spirilla very large and moving rapidly.

Experiment No. 2.

10 CC's of a 10 per cent. solution of—

1. Carbolic acid crystals and the other disinfectants enumerated in experiment No. 1. } Were added to 10 CC's of beef infusion, swarming with bacteria having been kept for nearly one month.

The preparations thus obtained were carefully placed in glass stoppered bottles and examined by the microscope after the lapse of 24 hours.
The powers employed were $\frac{1}{8}$in. and $\frac{1}{12}$in. immersion lens.

Agent used.	Results.
1. Carbolic acid crystals	Bacteria nowhere visible in the field as before, but seem replaced by micrococci, with very active motion; no precipitation.
2. Carbolic acid -	Bacteria very minute and free in the field and still very obviously in motion.
3. Chloride of lime -	Bacteria nowhere visible in the field but apparently disorganized in thin cloudy films, in which they could only be distinguished by an experienced observer.
4. Chloralum liquid -	Bacteria in zooglæa form, and in the interspaces very active, they seem to be partly precipitated here and there in filmy masses.
5. Condy's fluid -	Bacteria free and in zooglæa form, no diminution in the activity and no attempt at precipitation, many excursive.
6. Universal disinfectant powder.	Bacteria free and in zooglæa form, active but none excursive, movements somewhat lessened.
7. Terebene Liquid -	Bacteria very active and excursive, no attempt at precipitation, vibriones in large amount.
8. Terebene powder, green.	Bacteria largely precipitated in a flocculent mass, some very slight movements just perceptible among those free in the interspaces, none excursive.
9. Terebene powder, yellow.	Bacteria precipitated, and those free in the interspaces were nearly motionless.
10. Sanitas - -	Bacteria extremely active and excursive, both free and zooglæa form present, no precipitation. The rods appear very much lengthened.
11. McDougall's disinfecting fluid.	Bacteria free and in zooglæa form and very active, none excursive, no attempt at precipitation.
12. Phenyl - -	Extremely minute bacteria visible all through the field, motion very active, some excursive and no precipitation.
13. Burnett's fluid -	Extremely little movement, bacteria appear precipitated in some parts of the field, there was more movement in the interspaces.
14. Eureka - -	Bacteria very active and here and there in zooglæa form, no attempt otherwise at precipitation, many excursive.
15. Sporokton - -	Vibriones, spirilla, and other bacteria in very active motion, no attempt at precipitation, a few excursive.

Experiment No. 3.

15 CC's of a 10 per cent. solution of—

1. Carbolic acid crystals and the other disinfectants examined in previous experiments. } Were added to 10 CC's of beef infusion swarming with bacteria having been kept for nearly five weeks.

These preparations were treated in the same way as the previous ones, and examined after the lapse of 21 hours.

The power employed was $\frac{1}{5}$in.

Agent used.	Results.
1. Carbolic acid crystals	Micrococci of various size in active motion all through the field, very few micro-bacteria present, as though one form had been converted into the other, some excursive, no precipitate.
2. Carbolic acid -	Same as carbolic acid crystals, bacteria precipitated in clouds with apparently vacant interspaces, no movement visible.
(3. Chloride of lime, not repeated, as 10 per cent. was found efficacious.)	
4. Chloralum liquid -	Bacteria partly precipitated, but with large numbers free in the interspaces, still exhibiting movement which is very apparent.
5. Condy's fluid -	Bacteria filling the field with very great activity, no precipitation, bacillus very large and extremely active, various forms of bacteria very distinct.
6. Universal disinfectant powder.	Motion very much diminished, there appeared some precipitate, while those in the intervening spaces were reduced in size, and the bacteria generally appeared disorganised.
7. Terebene liquid -	Bacteria show very great activity, their movements excursive, and if anything increased, no precipitation, the oily parts of the fluid would appear to entangle the bacteria mechanically.
8. Terebene powder, green.	Bacteria all through the field largely precipitated in flocculent masses, motion of free bacteria in the intervening spaces scarcely visible.
9. Terebene powder, yellow.	Precipitation not nearly so great as in the green variety, free bacteria more numerous and activity more distinctly apparent, but still no excursive movements.
10. Sanitas - -	Activity of bacteria hardly diminished, present both in the free and zooglæa form, no attempt at precipitation, a few excursive.
11. McDougall's disinfecting fluid.	Bacteria active, many excursive, no precipitate, forms very distinct.
12. Phenyl - -	Micrococci of various sizes present, there seems to be a change in the form of the bacteria, the rods are shortened and ultimately assume a micrococcus form, activity among these minute forms very great, no precipitation.
13. Burnett's fluid -	Bacteria in zooglæa form, movements active in the intervening spaces, but somewhat diminished compared to what existed in the original fluid, none excursive.
14. Eureka - -	Bacteria very active in zooglæa form and free in the interspaces, no precipitation, form very well defined, especially bacilli, many excursive.
15. Sporokton - -	Bacteria extremely active, many excursive, no attempt at precipitation, various forms very distinct and appear larger.

These experiments are extremely important, and confirm in the strongest manner the conclusions already arrived at in the matter of disinfectants, so called. The only substance to be at all depended upon, is the chloride of lime, and perhaps the green variety of terebene powder (equivalent I believe to the so-called *Cupralum*). Even of those the quantity necessary to be added to obtain the desired result is very large, much larger than would be practicable in ordinary cases. The same may be said with regard even to deodorant qualities, for in experiments made by myself some years ago, and reported to the War Office, I showed that to actually destroy the foul odour of stools, particularly dysenteric, putrid infusions, &c., an enormous quantity of any reagent was required, although some, such as carbolic acid and other substances, whose own smell is powerful, *masked* smell very effectually. That they did not destroy it, however, was shown by the return of the odour after a time, when the agent itself had evaporated to some extent. The following is an abstract of the results on sewage in bulk, as represented by the contents of an ordinary close stool, amounting to about 14 ounces of fœcal matter and urine mixed :—

1. Carbolic acid powder (Calvert's), 1 part of powder to 3 of stool, sufficient to mask the smell.
2. Liquor sodæ chlorinatæ (B.P.), 2 parts of liquid to 1 of stool, sufficient to destroy smell. This proportion would represent about one-third of the solid agent.
3. Chloralum liquid, 5 parts to 1 of stool insufficient.
4. Chloralum powder, 3½ parts to 1 of stool quite insufficient.
5. Universal disinfecting powder, 8 parts to 1 of stool quite insufficient.
6. Cupralum (Terebene powder, green), 1 part to 3 of stool sufficient.

In dealing with a large bulk of sewage like a stool it is obviously difficult to ensure uniform conditions, with small quantities such as one or more CC's it is more easy. The following were the results thus obtained :—

1. Carbolic acid powder (Calvert's), 1 part to 10 of sewage, sufficient to *mask* odour.
2. Liquor sodæ chlorinatæ, 4 parts to 10 of sewage, sufficient to destroy odour. (This is equal to about 1⅓ of the solid reagent).
3. Chloralum liquid, 30 to 40 parts for 10 of sewage, required to do away with odour.
4. Chloralum powder, 30 to 35 parts for 10 of sewage, required to do away with odour.
5. Universal disinfecting powder, 40 to 50 parts for 10 of sewage, required to do away with odour.
6. Cupralum (Terebene powder, green), 6 parts to 10 of sewage, effectual in at least masking odour.

Experiments were also made on the effects on hydrogen sulphide and ammonia, with the following results :—

1. Carbolic acid powder (Calvert's) does not affect H_2S or NH_3.
2. Liquor sodæ chlorinatæ, neutralises both H_2S and NH_3, its effect depending on quantity.
3. Chloralum liquid, neutralises NH_3, effect on H_2S only slight.
4. Chloralum powder, neutralises NH_3, no effect on H_2S.
5. Universal disinfecting powder, neutralises H_2S, but not NH_3.
6. Cupralum (Terebene powder, green), neutralises both H_2S and NH_3.

The most complete action is therefore by the chlorinated compounds and cupralum, although we cannot say more of the latter than that it *masks* fæcal odour.

The conclusions to be drawn are: 1st. *Disinfection*, in the strict sense of the term, can hardly be looked for, except by the agency of high temperature, or the most extensive use of reagents in highly poisonous quantities. 2nd. *Deodorisation* may be to some extent accomplished, either by actual destruction of compounds giving out smell, as in the case of chloride of lime, or by masking them by a more powerful odour, as in the case of carbolic acid, &c. 3rd. Disinfectants (so called) may, however, be of use in some instances, if we take advantage of their power of destruction of life or suspension of vitality, so as to obtain a temporary influence which may enable us to avert certain dangers. Thus, the immediate addition of a reagent to the stool of an enteric or dysenteric patient may enable us to remove it without danger, and, if the reagent is

strong enough, even to pass it into drains without very great risk. But to depend upon disinfection as a substitute for proper measures of conservancy, for the proper flushing and ventilation of drains, or for the proper amount of ventilation and cubic space, is, in my opinion, to commit an error of the most fatal kind.

6. *Propagation of Disease.*—I may call attention to the "Papers on the Modern "History and Recent Progress of Levantine Plague," published by the Local Government Board, as containing information of great interest on this important question; they came, however, too late into my hands to enable me to give an analysis of them here.

Enteric Fever.—A destructive outbreak of this disease took place last year at Caterham and Redhill, in Surrey, where a large number of cases suddenly occurred. Dr. Thorne Thorne, who investigated the case, believed the contagion to have arisen in this way; the wells of the water company (in the chalk) requiring repair and enlargement, a number of men were employed in them and in the adits uniting them. One of these men, who appears to have been suffering from a mild attack of enteric fever, seems to have defæcated in the adit, contrary to orders, and it was also proved that even if the buckets had been used as directed there was strong probability of fæcal matter being shaken into the water in drawing them up. About 12 days after the man in question began to work, enteric fever showed itself among the consumers of the water, whereas it was absent in another section who were supplied with water from another source. As soon as the water was suspected it was pumped to waste and permanganate thrown in, the wells and adits being well scraped and washed with chloride of lime. Those precautions under the orders of Dr. Thorne Thorne were apparently successful, as the fever then ceased.

Among the Royal Marine Artillery at Eastney Barracks, Southsea, enteric fever has broken out from time to time since their first occupation in 1864. Last year (1878) a serious outbreak, with some fatal cases, took place, in consequence of which Professor Macdonald, R.N., F.R.S., and myself were directed to report upon the condition of the barracks. This we did in October 1878. We found that the drains were unventilated, that the overflow, waste, and sink pipes passed direct to the drains, and that the closets were untrapped except by means of the antiquated D. trap. The sewage passed into the sea, but the tide washed up the sewer at high tide to some distance, blocking back the sewage and favouring the production of sewer gases. The blocks of building most affected were the officers' quarters, or those which would be most directly or immediately affected by this action of the sea-water. On the other hand the married men's quarters, containing over 300 persons, the majority of them children, and therefore specially susceptible, were not invaded by the disease, the reason apparently being that they were the remotest from the sea and the least likely to be affected by its action, and that external latrines were in use almost entirely. We recommended the freest ventilation of the main drains; the disconnection of all soil-pipes by means of open traps; the ventilating of the soil-pipes themselves; the sealing up and disconnection of disused closets and sinks; the cutting off of all waste, sink, and overflow pipes, and their delivery over trapped gratings in the open air; the provision of proper means for flushing, and the construction of a large ventilating shaft in the main drain between the outflow and the barracks. All those measures have been carried out, and, although the time is too short yet to judge of results, it is satisfactory to know that no fever has occurred since, a result which it is to be hoped will be continuous in the future.

APPENDIX No. II.

LIST OF OPERATIONS PERFORMED AT THE ROYAL VICTORIA HOSPITAL, NETLEY, DURING THE YEAR 1878, WITH SHORT ABSTRACTS OF THE MORE IMPORTANT CASES.

By Surgeon-Major J. H. PORTER, A.M.D., Assistant Professor of Military Surgery.

Operations.	Number of Cases.	Diseases.	Result.				Remarks.
			Successful.	Otherwise.	In Hospital.	Died.	
Amputations.							
Second phalangeal joint, forefinger, left hand.	1	Contraction of finger, left hand, from a wound.	1	—	—	—	
Second phalangeal joint, forefinger, right hand.	1	Contraction of forefinger, right hand, from a wound.	1	—	—	—	
Excisions of Joints.							
Right ankle joint - -	1	Pulpy degeneration and caries.	1	—	—	—	See Case No. 1.
Right wrist - - -	1	Pulpy degeneration and caries.	1	—	—	—	See Case No. 2.
Urinary Organs.							
Lateral lithotomy - -	3	Vesical calculus -	3	—	—	—	See Cases Nos. 3, 4, and 5.
Aspiration of bladder -	1	Stricture of urethra -	—	—	—	1	See Case No. 6.
Puncture of bladder -	1	" " -					
Perineal section (Syme's) -	1	" " -	—	—	1	—	See Case No. 7.
Radical cure of stricture, Holt's.	1	" " -	1	—	—	—	See remarks on stricture of urethra.
By dilatation - -	34	" " -	34	—	—	—	
Genital Organs.							
Tapping and injecting with iodine.	5	Hydrocele - -	5	—	—	—	
Circumcision with Ricord's forceps.	3	Phymosis - -	3	—	—	—	
On the Anus.							
Removal by Smyth's clamp	4	Hæmorrhoids - -	4	—	—	—	
Division of sphincter -	8	Fistula in ano - -	8	—	—	—	
Tumours.							
Removal of - - -	1	Tumour, right side of forehead.	1	—	—	—	
" - - -	1	Left side of neck -	1	—	—	—	
Respiratory Organs.							
Tracheotomy - -	1	Diptheria - -	—	—	—	1	See Case No. 8.
On the Eye.							
Abscission of cornea -	1	Opacity of cornea and staphyloma.	1	—	—	—	

Operations.	Number of Cases.	Diseases.	Result.				Remarks.
			Successful.	Otherwise.	In Hospital.	Died.	
On the Ear.							
Removal of polypus -	1	Polypus, right ear -	1	—	—	—	
Miscellaneous.							
Forcibly breaking down -	1	Contraction of both knees from rheumatism.	—	—	1	—	
" " -	1	Contraction of right elbow.	1	—	—	—	
" " -	1	Contraction of thumb	1	—	—	—	
Skin grafting - -	2	Ulcers, right leg -	2	—	—	—	
Plastic operation on lower lip.	1	Gun-shot wound -	1	—	—	—	
Tapping liver - -	1	Abscess of liver -	1	—	—	—	
Removal of necrosed bone -	4	Disease of bone -	4	—	—	—	See description of one Case No. 9.

Case No. 1.—*Excision of the Right Ankle Joint for Caries.*

No. 1,036, Private R. H., 2nd battalion 13th Regiment, aged 20, service $1\frac{6}{12}$ years, of which seven months were spent at Malta.

A rather strumous looking lad whose family history appears to be good, and states that he has always been healthy. His illness dates from the 10th of November 1877, at which time he was stationed at Malta, where he was admitted with acute inflammation of the right ankle joint. He first noticed a dull pain which came on gradually, and was followed after a few days by swelling. There is a history of slight rheumatic pains in the arms on three or four occasions, but no history of injury. A few days after admission to hospital the inflammation became so severe that he was unable to stand or walk, and there being no prospect of his being benefited by remaining at Malta, was invalided to Netley, where he arrived on the 3rd of March 1878. He was then in a pale anæmic condition, ankle very much swollen, but not to say painful on pressure, and there was no appearance of suppuration having taken place in the joint.

Rest for the joint was at once enforced by means of a plaster of Paris bandage, which enabled him to move about with ease, and from being able to enjoy fresh air, and with the use of tonics he appeared to improve.

On the 28th of March there was considerable pain in the joint, when it was found necessary to remove the plaster of Paris bandage. Suppuration had taken place in the soft parts at the lower end of the fibula, and on examination it was found a probe could be passed through a sinus under the soft parts at the back of the ankle anterior to the tendo achilles, and be felt on the inside of the joint, but no exposed bone could be detected.

Free incisions were made at either side of the joint, which were kept open by means of drainage tubes, and the limb well supported. After this he again appeared to improve greatly, but about the beginning of May the ankle joint became much swollen and painful, it is remarkable, however, that there was no increase of pain, when the articulating surface of the joint were forcibly pressed together, this may have been due to the fact of the bones (especially the astragalus) being denuded of cartilage, as was observed when the joint was opened into at the operation. A probe could now be passed under the fibula, but still no exposed bone could be detected, it was, however, apparent that the joint was extensively implicated and that some operative measures were necessary.

It was decided to excise the ankle, the man's youth giving to the operation every prospect of success.

On the 13th of May, I performed the operation by two lateral incisions as recommended and practised by Mr. Hancock, the limb being rendered bloodless and the patient under the influence of ether. The wound was freely

CASE No 1.

EXCISION OF THE RIGHT ANKLE JOINT.

Appearance of P^t. Honyborn five months after excision of the right ankle.

Fred^k Dangerfield, lith. London.

Fig. Nº 2.

Nº 834. Private Charles Pritchard 1/24 Regiment, Five months after excision of the right wrist.

Fredk Dangerfield, lith. London.

irrigated with iced water, and then sponged with a solution of chloride of zinc 30 grains to the ounce of glycerine. When Esmarch's elastic bandage was removed, there was not a single vessel required any interference, and by exposure of the wound to the air, all active oozing was checked.

A horse hair was placed in the back of the wound for the purpose of establishing drainage, and both wounds, except at the depending angles, closed with sutures of silver wire.

The limb was put on a light wooden back splint with a foot piece, and in front a strong wire anterior (Smith's) splint, the whole enclosed in cotton wool, and secured with a plaster of Paris bandage, so arranged that the wound could be dressed, and when dry it could be suspended from a parallel bar placed over the patient's bed.

There was slight oozing from the wound for about 12 hours, but he progressed most satisfactorily, there being very slight increase of temperature, or surgical fever, all functions remaining normal.

On the 28th of May removed splint for the purpose of cleansing it, when the wounds were found to be healing steadily, and no inconvenience had occurred from the long continued pressure on the heel, the splint having been hollowed out to receive it.

On the 5th of June removed the horse hair drainage, as it appeared to be causing considerable irritation, it was replaced by a fine tube which was more comfortable.

The plaster of Paris splint was removed on the 15th of June, and a light wooden side splint substituted, which gratified the patient very much, as it enabled him to shift his position in bed and to be moved into the open air.

Towards the end of July he was able to place his foot on the ground, perfect union having taken place between the tibia and astragalus. From time to time several superficial sinuses formed which were duly laid open, and healed from the bottom with salycilic acid lotion.

By the end of November the wounds and sinuses had completely healed, the swelling in the neighbourhood of the joint had almost subsided, and he was able to walk up and down stairs, or on the level with very little assistance. (The illustration represents his general condition. His health had improved, and from being thin, pale, and dejected looking, he had become stout, florid, and intelligent. He was discharged from hospital to his home December 17th 1878.

Case No. 2.—Excision of the Right Wrist Joint for Pulpy Degeneration and Caries.

No. 834, Private C. P., 1st battalion 24th Regiment, aged 20, a delicate looking lad of two years' service, one of which he spent at the Cape of Good Hope. Family history appears satisfactory.

On the 5th of September 1877 he was attacked with measles which confined him to hospital for about a week. On the 29th of the following month he returned to hospital, complaining of pain in the right hip, causing partial lameness, also pain, swelling, and inability to use his right wrist. While in hospital he was treated with liniments and counter irritants under which his hip completely recovered, the wrist, however, showed no signs of improvement. He remained under treatment until the 4th of June 1878, when he attempted to perform his duty but was unable to do so, and was again placed under treatment. He was then invalided to England where he arrived and was admitted into Netley Hospital on the 28th of June.

The right wrist was then swollen especially on its posterior aspect; this enlargement extended chiefly in an upward direction, and seemed to implicate the sheath of the extensor tendons. Pain was almost absent over the back of the joint but was felt in front on pressure over the pisiform bone. There was no distinct sensation of fluctuation, but the soft parts had an undoubted pulpy feel when manipulated.

All the movements of the joint were lessened—that of extension being almost entirely lost, as when the forearm was held in a horizontal position the hand dropped.

With a view to try and avoid operative measures, the hand and forearm were dressed with mercurial strapping, and kept at rest until the middle of July,

when it was found the wrist was more swollen, painful, and perfectly helpless. He had no power of extension, pronation, or supination, his fingers were, however, flexible, and he had fair power to grasp with them.

Any movement of the wrist, especially pressing the carpal bones against the radius and ulna gave great pain.

On the 21st of July, I performed excision of the joint by Professor Lister's method and by the "bloodless operation," the patient being under the influence of ether. After the operation had been completed, the surface of the wounds were freely washed with a solution of chloride of zinc, 30 grains to the ounce of glycerine. The dorsal wound having been closed with wire sutures. Throughout its extent, a stitch was placed at either end of the ulnar wound so as to reduce its great length.

The cavity left by removal of deseased bone and tissue, was filled with carbolised oil lint, with a view to support the soft parts and establish drainage through that part of the ulnar wound left open.

Mr. Lister's splint was applied in the usual manner, but in bandaging it to the limb a soft dry sponge was placed over each wound, and included in the turns of the bandage, with the intention of exerting even pressure and so try and prevent hæmorrhage which so frequently occurs after the bloodless method of operating.

Slight oozing took place 12 hours after the operation, but which did not necessitate the opening of the wounds. The only unpleasant symptom which immediately followed the operation, being retention of urine, which required the use of a catheter for its relief.

On the 23rd, or second day after the operation, fresh dressings were applied, when slight flexion of thumb and fingers were enforced.

On the 24th all the sutures were removed when the dorsal wound was found to have almost united. His skin was cool, temperature 99°, and general condition satisfactory.

On the 1st of August, motions to secure pronation and supination of the hand and forearm were commenced and carried out in addition to that of flexion of the fingers.

On the 3rd of August he was attacked with headache, followed by nausea, coldness of the extremities, and redness of the hand and forearm. Temperature 104·2, shivering and hot skin, in fact erysipelas had set in. His hand and fingers became greatly swollen, necessitating the suspension of all exercises, and for a considerable period his condition was most serious, and the prospects of saving his hand very doubtful.

By the end of August he became convalescent, the swelling in the hand and fingers gradually subsided, and by the 5th of September, considering all circumstances, he had wonderful use of them, being able to lift a hair-brush off the table and apply it to his head. Mr. Lister's splint was now removed and replaced by one made of gutta-percha moulded to the hand and fore-arm, leaving the thumb and fingers free.

On the 9th of August he commenced writing exercises, but having little knowledge of that art he felt under great difficulty; however, he made a very good attempt, being able to grasp a small pen handle with his fore-finger and thumb.

In October he commenced using a weight suspended over a pulley, from which he derived great advantage, as he found it strengthened his forearm and hand and fingers.

By the end of November he had so far recovered as to wish to be allowed to proceed to his home, he was then in the following condition:—General health much improved, wounds of operation healed, has fair power of pronation and supination, can approximate fore and middle finger with thumb unassisted, and with a little aid the ring and little fingers may be approximated with the thumb.

Before the operation he was unable to flex thumb or fingers, or extend the hand, he can now fully extend the hand and fingers and by them support a light weight. He is able to grasp a brush or comb and use them for arranging his hair. He can lift a weight of 25 lbs. with the greatest ease. He can pick up a pin or other small article, and has made steady progress in writing. Discharged the service to his home December 10th, 1878.

CASE Nº 2.

Fig. Nº 1.

EXCISION OF THE RIGHT WRIST JOINT.

Bones of the right wrist joint removed from Nº 834. Pt Charles Pritchard 1/24 Regiment (Listers method of excision) by Surgeon Major J. H Potter.

CASE Nº 3.

Mc PARLAND.

Vesical Calculus.

Fredk Dangerfield, lith. London.

Illustration No. 1 shows the bones of wrist joint, natural size, and illustration No. 2 represents the patient five months after the operation.

Case No. 3.—Vesical Calculus. Lithotomy.

No. 585, Private P. M°P., aged 24, strong well developed looking man.

In June 1875 he was 22 days in hospital suffering with gonorrhœa. Otherwise he always enjoyed good health until January 1877, when the first symptoms of his present disease appeared. At that time when serving at the Cape he had to be relieved very often when on duty, to micturate. At each time he passed very little urine, accompanied with scalding, and he had considerable pain after the passage of the urine. On taking active exercise he felt pain in the glans penis. These symptoms gradually increased in severity until he was quite incapacitated from taking active exercise in consequence of the intolerable pain it caused. On the 13th August 1877 he was admitted into hospital at the Cape, the disease being returned as "Hæmaturia," but he states that he only passed blood from the urethra once in his life, and that was immediately after a catheter had been passed. He was discharged from hospital on the 20th August 1877, but was again admitted for the same disease on the 30th of the same month. He was discharged from hospital on the 17th of September, but was again admitted on the 26th of the same month, and he remained in hospital until his departure for England on the 4th June 1878. At first his disease was returned as cystitis, but on the 21st of November 1877 it was changed to calculus of bladder. During his time in hospital he had alternating periods of exacerbation and subsidence of his symptoms. Suddenly, and without any evident cause, he suffered from frequent and urgent desire to make water, the pain during and after the passage of the urine being very severe. These aggravated symptoms usually lasted about three weeks, and suddenly, as they began, they again disappeared. While they were present he could only obtain sleep by the aid of soporifics. The period of subsidence that followed usually continued for about a month, when he enjoyed comparative ease.

He arrived at Netley on the 28th June 1878. On arrival he seemed ænemic, otherwise his general health seemed fair. Since admission he has suffered very little irritability of the bladder, having to pass urine only about six times during the 24 hours, two or three times of which were during the night. There has been very little pain during the passage of the urine, and the stream has never stopped suddenly. The following is the result of an analysis of his urine, made on the 3rd July 1878:—Total quantity 26½ oz. Reaction, acid. Clearness, marked turbidity. S.G. 1,018. Sediment, copious white amorphous. Colour, yellowish brown. Urea, 254 grs. Chlorides, normal. Sugar, none. Albumen present in small quantity. Microscopic examination of the sediment showed that it consisted entirely of pus cells. No crystaline form could be discovered. Examination with a sound revealed the presence of a stone, hard, and not encysted.

10th July 1878. Lateral lithotomy was performed this day. There was no difficulty experienced in reaching the bladder and feeling the stone, which was extremely rough; the forceps grasped it with ease, but it was impossible to withdraw it on account of its roughness and great size. The prostrate was, therefore, incised and the finger passed into the bladder through the wound so as to liberate the stone whenever its rough surface caught in the wound; by this means, and after some difficulty, it was extracted. There was very little hœmorrhage. The patient was very sick after the chloroform, and during the afternoon was greatly troubled with distention of the abdomen and flatulence.

July 27th. Has progressed most satisfactorily. Some drops of urine came through the urethra last night.

29th. Urine is passed in a stream through the urethra.

31st. Urine continues to flow through the urethra, and wound is healing steadily.

September 6th. The wound is not quite closed, and there appears to be some irritation of the bladder. Urine ever since operation has contained a large quantity of ropy mucous, but during the last few days the quantity has diminished.

Introduced a French elastic catheter and removed hal a pint of urine.

October 5th. Fistula remains open notwithstanding daily introduction of elastic catheter. Introduced a No. 5 silver catheter and tied it in.

October 6th. No urine has passed through the wound since introduction of silver catheter.

October 10th. Withdrew catheter altogether, no urine having come through the fistula since the 5th, equal 120 hours.

October 11th. Two or three drops of urine having passed through fistula, reintroduced silver catheter and secured it as before, applying at the same same time the actual cautery by means of a thick wire to fistula. The catheter was removed daily, cleaned, and reintroduced until the 22nd, when it was withdrawn altogether, and he was directed not to use any undue force in micturating.

With the exception of persistent cystitis this man's health and condition steadily improved. The usual remedies were used to try and relieve this troublesome complication, but without any beneficial result, until a weak solution of nitrate of silver (half a grain to the ounce of distilled water) was injected once a day, after this his vesical condition improved. The injection was made stronger, two grains to the ounce being latterly used, and the disease gradually subsided.

Description of Calculus.

Physical Characters.—The stone measured 1 inch $\frac{7}{10}$ths, presenting numerous mulberry-like projections, each being again divided into smaller tuberculations many of which are quite echinate or still further divided into more or less acute points. Here and there a white incrustation occurs, but the more internal parts of the calculus are of a dingy purple hue and concentrically laminated.

Chemical Analysis.—The external coating was found on examination to consist of carbonate of lime, phosphate of lime in small quantity, and traces of oxalate of lime. The inner portion is formed of oxalate of lime. Traces of phosphate of lime and a little urate of ammonia.

The illustration is from the pencil of Professor J. D. Macdonald, F.R.S., R.N., and shows with the greatest accuracy the beautiful and wonderful outline of the calcus. The analysis has been kindly made by Surgeon-Major J. Law Notter, Army Medical Department.

Case No. 4.—Vesical Calculus. Lithotomy.

No. 5,087, Gunner T. C., Royal Artillery, aged 30, was admitted into Netley Hospital on the 3rd of April 1878, having been invalided from Saugor, Central India, with stricture of the urethra. The following history accompanied him:—"According to his own account, had been operated on in Shorncliffe for "stricture, but there is no record of it in his medical history sheet. Since "that time, up to about the 12th October 1877, he suffered no inconvenience "from stricture. Was admitted into hospital on the 3rd November 1877, "complaining that he could not pass urine in a stream, but that it continually "dribbled from him, soiling clothing and bedding. Since then many "attempts have been made to pass a catheter by medical officers, but without "success. Metallic as well as gum elastic instruments have been tried. "There is one stricture about 2 inches from the orifice of the urethra which "can be penetrated by a catheter; the other, through which an instrument "cannot be passed, is about 5 inches from the meatus."

It appears that eight years ago he suffered from gonorrhœa, which lasted four weeks. Never received any injury to the perineum.

He says that in October 1877 he first noticed a feeling of weakness in the perineum, frequent micturition, especially at night; a diminished and scattered stream, requiring much straining after micturition; dribbling, causing much discomfort, and subsequently incontinence.

In November 1877 felt pain in glands, penis, lumbar and hypogastric regions, extending down to the groins and thigh. During micturition the stream would suddenly stop. Never passed blood after micturition. Sudden movements caused pain, and for some time prior to attending hospital experienced pain in bladder when performing his duties as an artilleryman in jumping off a waggon.

On arrival at Netley he was in a most wretched state of health, having suffered much during the voyage home; urine was dribbling from him, ren-

dering his clothes wet and offensive. His countenance was expressive of great suffering, and when an attempt was made to examine the urethra with an instrument there was an involuntary copious discharge from the bladder, of mucus, having a ropy tenacious character. No. 5 metal catheter was at first introduced, after some difficulty, and a considerable amount of dark-coloured fœtid urine withdrawn.

On the 13th of April No. 8 catheter was introduced with the intention of washing out the bladder, when the click of a stone was distinctly audible. From this time forward he derived relief in every respect, and by daily passing sounds, No. 11 was reached, when, on the 24th of April, being under the influence of chloroform, I performed lateral lithotomy, and removed a calculus, having an external crust or shell with soft mortar-like centre, weighing over one ounce. From the date of the operation he steadily improved in appearance, and rapidly regained health and strength, the urine passing in large gushes through the wound until the 7th of May, or fourteenth day after the operation, when it came through the urethra, but on the 8th appeared again through the wound.

The wound healed to nearly its entire length, a fistulous opening remaining near its lowest end, through which a small quantity of urine passed every time he micturated. His bladder showed signs of great irritability by the thick deposit of mucus which was in his urine. On the 8th of July a No. 8 French bulbous catheter was delicately passed into the bladder and the urine drawn off. This process was continued daily, accompanied by the internal use of spirits of turpentine, until the 4th of August, no urine having meantime appeared through the wound, but on this date one drop presented itself, with slight lancinting pain. The application of the point of a thick knitting needle heated in a lamp produced a dry eschar, after which the healing of the wound was complete, and he was discharged to duty on the 6th September.

Description of Calculus.—This calculus presented the appearance of a crushed mass of a yellowish brown colour. The particles of which it was composed broke up on the least pressure into a finely divided mass.

Chemical examination.—On examination this calculus was found to consist almost altogether of uric acid (C_{10} H_4 N_4 O_6), with traces of urate of ammonia and phosphate of lime.

Case No. 5.—Vesical Calculus. Lithotomy.

Private A. R., 1/21st Regiment, aged 29 years, of six years' service, the three last of which were spent in Bermuda; arrived at Netley Hospital on the 16th of April 1878, having been invalided with stricture of the urethra.

There is no history of syphilis or gonorrhœa, nor of intemperance. Three years before admission he began to be troubled with frequency of micturition after any exertion; at the same time he had attacks of pain in the perineum, and passed occasionally a little blood with the urine. These symptoms only occurred at intervals; if he remained quiet he passed no blood. They continued on and off until September 1877, when, on account of the increase of pain, he applied for surgical aid. At this date he had also attacks of sudden stoppage of the urine before the bladder was emptied, whilst micturating.

The pain was felt during the act of micturition, but especially so at the end of the act. It was only felt in the perineum, never at the end of the penis.

Exacerbation of symptoms occurred in February 1878, and he was under treatment for 14 days at Secunderabad with symptoms of stricture of the urethra, but it appears that all attempts to relieve the bladder by means of instruments were unsuccessful.

On the 18th of April, while examining the urethra with a No. 8 metal sound, which passed easily into the bladder, a click of a large stone was clearly audible, especially after attaching a sounding board to this instrument. The bladder was in a state of great irritation. His general health was much broken down; urine ammoniacal, containing much ropy mucus, and an abundant deposit of triple phosphate. The immediate bladder symptoms were relieved by hip baths and specific vesical remedies.

On the 29th of April, the patient being placed under chloroform, I performed lithotomy by the lateral operation, and extracted an elliptical dark brown mammillated stone of about the size of a bantam's egg. There

was very little hæmorrhage at the time of the operation, or subsequently, and he progressed favourably till the evening, when his temperature rose to 103·4, pulse 130, and skin very hot. He passed a very bad night, and on the succeeding day distention of the abdomen appeared, with constant hiccup. The latter symptoms, however, had been present on board ship on the voyage home, but had not been noticed at Netley previous to the operation. There was some amount of tenderness over the abdomen, but considerable pressure could be borne without any actual pain being experienced. Fomentations were applied constantly over the abdomen, and on the fourth day the distension began to subside. During these distressing symptoms hiccup was incessant, and, notwithstanding various methods of treatment, it was not relieved until he had taken two pills containing one grain of carbolic acid in each. Shortly after the second pill had been administered the hiccup disappeared, and did not return.

The action of the carbolic acid is, I consider, worthy of special notice, as it was the second case in which I found it of benefit where hiccup accompanied or was consequent on disease of the urinary tract. Its use was kindly suggested to me by Professor Aitken, F.R.S.

On the 8th of May, or a month after the operation, the patient was looking much better: anxiety of countenance had disappeared.

All urine still passed through the wound, the edges of which were looking healthy.

On the 12th of May some urine passed through the penis, and by the 18th it ceased altogether to pass through the wound. He now steadily improved in health, and was discharged from hospital on the 25th of June.

Case No. 6.—*Impermeable Stricture of the Urethra. Complete retention of Urine. Aspiration of the Bladder.*

Aspiration of the bladder for immediate relief has been practised by Dr. Dieulafoy and others, but is not as popular an operation as puncture of the bladder per rectum, this perhaps is natural, as one evacuation of the vicus by aspiration is not likely to be sufficient for the permanent relief of a patient suffering from retention of urine consequent on impermeable stricture.

The following case has some points of interest as showing the utility of aspiration under certain circumstances.

Private G. P., 1/5th Fusiliers, aged 31, of 13 years' service. Landed in India in 1867 when he suffered a good deal from intermittent fever. In 1873 he suffered from incontinence of urine, which he says was the result of debility, for this he was sent to Nynee-Tal for change of climate. While there he contracted syphilis and gonorrhœa, the latter was followed by stricture of the urethra.

In March 1877, while under treatment for stricture, a perineal abscess formed which resulted in a fistula. His general health now became much impaired and shattered, and he was invalided to England.

There is some indistinct history of an injury to the perineum from a blow with a tent pole, which had some connexion with the incontinence of urine, but the patient himself is not very clear about it.

Arrived at Netley on the 4th of April 1878 in a very weak and debilitated condition, having a most peculiar yellow appearance of the skin. His perineum was infiltrated and thickened, in which were two fistulæ, through which a large proportion of the urine passed.

On examining the urethra I found a hard cartilaginous stricture 5½ inches from the orifice through which no instrument could be passed; this hard condition extending back to the neck of the bladder.

On the 24th of April he was attacked with acute rheumatism in all the joints, accompanied by profuse perspiration having a strong sour smell, his urine now only came through the fistulous openings in drops, and his bladder being greatly distended I aspirated it above the pubes with Coxeter's aspirator, 46 ounces of urine were removed, followed by great relief, and he fell into a most refreshing sleep.

On the following day he felt much better, a considerable quantity of urine had passed through the urethra, due probably to the distended bladder having exerted some pressure on the internal meatus.

His abdomen was however much swollen and tympanitic, but without pain, and his general appearance was much improved.

From this time forward he passed during the 24 hours upwards of 90 ounces of urine of dark colour, very offensive, and containing a thick deposit of mucous.

On the 16th of May I was able to reach the bladder with a very fine whalebone bougie, but he would not tolerate its remaining in the urethra for more than a few minutes, and objected most strongly to any instrumental interference.

On the 25th of May there was complete retention of urine, when puncture of the bladder per rectum was performed and followed by some relief, but his condition now was that of urœmic poisoning, and he gradually sank and expired at 5 a.m. on the 27th of May.

Post mortem appearances as taken from the Pathological Register :—

"Body fairly nourished; skin pallid; rigor present; almost total absence of hypostatic congestion; prepuce in a state of ulcerated phymosis; lungs collapsed on opening the thorax, perfectly healthy; heart loaded with fat, right cavities occupied with very firm clots extending into pulmonary artery, tricuspid admits ball No. 12; pulmonary valves opaque; bladder adherent anteriorly to walls of abdomen, forms a large globular tumour projecting nearly 6½ inches above pubes, and measuring 6 inches from side to side; right ureter much distended and full of pus; bladder distended with dark puriform fluid; both kidneys distended with pus, pelvis of right extremely dilated encroaching on cortex, in which are situated numerous small purulent collections; left kidney in a similar position. The whole mucus membrane of bladder covered with gritty mineral coating, urethra lined with a thick false membrane; large prostatic abscess, and a large abscess in the neighbourhood of the left shoulder joint."

Case No. 7.—External Urethrotomy. Perineal Section with a Conductor.

The subject of this operation was W. M. of the 39th Regiment, aged 36, who had been suffering from stricture of the urethra since 1873, apparently due to gonorrhœa.

On arrival at Netley from India, April 1878, he was suffering from an extensive stricture extending almost from the external meatus to the neck of the bladder, the penis was hard, distorted, and unfiltrated, with two fistulous openings through which a considerable portion of the urine passed, causing great local irritation, and constitutional disturbance, from loss of rest, the calls to micturate being frequent night and day.

Beyond a fine bulbous pointed whalebone bougie no instrument could be made to pass more than half way down the urethra. By steady dilitation, however, the anterior portion of the urethra was dilated up to No. 5, when Holt's dilator was introduced in September and the urethra forcibly dilated. This was done with the hope that the more distant stricture might be dealt with afterwards.

Dilitation with metal sounds was attempted, but the parts being so hard, distorted, and infiltrated soon returned to their morbid condition. In October his health was beginning to suffer, he was complaining of pain in lumber region, had several rigors, and though able to empty the bladder, partly through fistulæ and partly through the urethra, had no prospect of permanent relief from his long suffering, it was therefore decided to perform perineal section, which operation, I performed on the 14th of October, the patient being under the influence of chloroform, and tied up as for lithotomy. On this occasion I dilated the urethra with a metal sound, until I could introduce Holt's dilator and so render the penial portion of the urethra capable of admitting a Syme's staff the penila portion of which being equal to an 8 or 9 sound.

After considerable difficulty Syme's staff was introduced into the bladder, when the usual steps of external urethrotomy with a conductor followed, and the bladder at once relieved. There was very little hæmorrhage, but there was some difficulty in reaching the fine groove in the staff from the depth and thickened condition of the perineum. A large gum elastic tube about 6 inches long was passed into the bladder and secured.

The patient experienced some shock from the operation with persistent sickness of stomach, this was followed by a large scrotal abscess, and an abscess above the pubes, both of which were freely incised, and by the 18th of November, all inflammation having subsided, an attempt was made to try and introduce a catheter, per urethrum, into the bladder, but from its distorted condition and strictures this was found impossible, it was therefore decided not to interfere any further with the urethra, but to establish a permanent exit for the urine in the perineum.

On November 26th, a large size silver tube was inserted instead of the gum elastic, and by means of a plug he could manage to draw off the urine when occasion required. This he found most convenient and comfortable, and after a little, was in a position to do without the tube, simply inserting it when necessary for the purpose of micturating.

Case No. 8.—*Tracheotomy in a case of Diptheria.*

The subject of this operation was a male child aged 4 years, who was attacked with sore throat on the 4th of February 1878, diptheria being prevalent among some of the soldiers' children at Netley. Notwithstanding most active treatment by Surgeon-Major Watts the symptoms became worse, and in the evening of the 7th diptheria became fully developed. On the morning of the 8th the child's breathing being very distressing, face livid and bathed in profuse perspiration, and death from suffocation impending, I performed tracheotomy in the usual manner, the patient being under the influence of chloroform. There was very little bleeding, but some difficulty in reaching the trachea from the movements of the larynx and trachea.

The operation was followed by the greatest relief, the breathing became quiet, and the face assumed a natural appearance. The disease, however, extended beyond the tracheal opening, and the little patient died on the 9th of February 21 hours after the operation.

The following are the *post mortem appearances* kindly furnished by Surgeon-Major Watts.

Thick deposit of lymph-like substance lined the larynx and trachea, extending as far down as the trachea could be removed without opening the thorax. There was some conjestion of the mucus membrane of the trachea below the site of operation wound, but very little redness in the upper part of the tube beneath the adventitious deposit. There were some patches of similar kind firmly adherent to the subajacent tissue in the pharynx, but the œsophagus presented a normal appearance. The buccal aspect of epiglottis was free from deposit, which was very copious immediately below the laryngial chink.

Case No. 9.—*Removal of the Greater Part of the Os Calcis.*

The patient was a soldier of the 1st battalion, 1st Regiment, 23 years of age. While stationed at Malta he accidentally sprained his left foot about the 1st of March 1878. A good deal of swelling resulted; this subsided, and he did not pay much attention to it beyond merely bathing it with a little cold water. However, about the 9th of April, finding it was not improving and the pain becoming more severe and of a lancinating character, he entered hospital. Suppuration now took place on the outer side of the foot about 1½ inch below the external malleolus; this was incised about the latter end of April, but the wound did not heal.

He was transferred to Netley Hospital in August, when it was found the os calcis was extensively diseased, and that through the openings of two sinuses a probe could be passed into the centre of the bone. There was a copious discharge of unhealthy fœtid pus; he was unable to place the foot on the ground from the great pain any pressure gave rise to, and his general health was much impaired.

The sinuses were kept free and the foot placed in a warm bath at about a temperature of 95° for one hour morning and evening, from this he appeared for a short time to derive some benefit, and it was hoped that the diseased bone might be thrown off; but on the 4th of October, there being no appearance of a permanent cure, it was decided to gouge out the diseased portion of bone.

Operation.—A long incision was made on the outer side of the foot about one inch below the end of the fibula, this was joined by a second striking at right angles to it and passing in front of the heel. Care was observed not to wound the tendons of the peroneus longus or brevis.

By means of a mallet and chisel the greater part of the os calcis was gouged away, and the wound dressed with a strong solution of chloride of zinc and glycerine. A second operation was performed in November, and a further portion of bone removed. Since then the excavated bone has gradually filled in, and he will in all probability make a slow but good recovery.

Remarks on Structure of the Urethra.

Thirty-seven cases of permanent stricture of the urethra were treated during the year 1878, all of whom were invalided from foreign stations, some being of a most obstinate and troublesome character.

Position of Strictures.—Of the 37 cases, two patients had each two strictures making a total of 39, having the following positions: one was at the external meatus, one at 2 inches, two at 2¼ inches, three at 3 inches, two at 3½ inches, one at 4 inches, one at 4½ inches, three at 5 inches, nine at 5½ inches, nine at 6 inches, one at 6¼ inches, four at 6½ inches, and two at 7 inches from the external meatus.

Cause of Disease.—Twenty-three patients suffered from one or more attacks of gonorrhœa, 3 from local injury, 10 from gonorrhœa and injury combined, and 1 could not account for the disease; 19 had used strong injections in the treatment of gonorrhœa, 4 suffered from fistula in perineo, 2 from fistula in ano, 1 from penile fistula, and 1 from scrotal fistula; 1 suffered from vesical calculus, 2 from spasmodic stricture, 4 from cystitis, 1 from pyelitis, 1 from urethral hæmorrhage, 1 had been treated on a former occasion by Holt's dilator, and 1 by perineal section.

Treatment.—In 34 cases gradual dilatation with metal and elastic instruments was carried out with marked success, the heavy solid steel sounds having a decided advantage over all others. In one case of penile stricture Mr. Holt's forcible dilator was successfully used followed by dilatation with metal sounds. One case required aspiration of the bladder above the pubes and puncture of the bladder per rectum, *see* Case No. 6; and in one case it was necessary to perform perineal section (external urethrotomy) by Syme's method, *see* Case No. 7.

APPENDIX No. III.

MEDICAL HISTORY OF THE GALEAKA-GAIKA WAR IN 1877-78.

By Surgeon-General J. A. WOOLFRYES, M.D., C.B., C.M.G., Principal Medical Officer, Cape of Good Hope.

IN this war the British Government had to do with the two great Kafir tribes, viz., the Galeakas, of which Kreli was chief, from Galeaka Kreli's great grandfather; and the Gaikas, of which Sandilli was chief, from Gaikas Sandilli's father.

Territory comprised in scene of war.

These two tribes had previously given us infinitely more trouble then any others. The Galeakas under Kreli occupied the country between the rivers Kei and Bashee, and were separated from the Fingoes, their neighbours, by the river Butterworth on the north, their southern boundary being the sea-coast. They were conquered in the last Kafir War in 1853, he and his people being driven across the Bashee into the country now occupied by the Bomvanas. His territory remained for some time vacant. It was then proposed that the land should be given out in farms to Europeans, but this necessitated the presence of troops for their security, and economy being the order of the day, it was ruled that Kreli should be allowed to return. Kreli was badly off for land and means of living across the Bashee, and was, therefore, urgent in requesting permission to return. He promised to be a good neighbour if allowed to occupy even a portion of his former territory. He came back and lived peaceably up to the time of the recent outbreak.

The Gaikas under Sandilli were also conquered in the last war, and they became British subjects living in British territory on the east side of the Kei River, between it and the Great Fish River. Though long been subjected, they have never been regarded as quiet subjects such as the Basutos and the Fingoes. There have always been dreads of their rising, as was notably the case in 1876, but these were always looked upon simply as scares got up by interested individuals; and although those living in their neighbourhood never ceased to declare since the rising of Kreli that the Gaikas would surely be up in arms against us, they were only looked upon as alarmists.

Cause of the war.

The outbreak of the Galeakas which occurred in September is supposed by some to be the result of a long premeditated combination on the part of the natives, and that the explosion took place prematurely.

It was said that the chief of the Galeakas had a firm belief that he was destined some day to conquer the English. In this belief, in obedience to a wonderful prophecy, he in 1857 destroyed his own cattle and his own corn. This act of madness more than decimated the tribe by starvation instead of procuring him victory. Of late this belief of his had been very strong, causing him to listen with increased attention to his witch doctors.

The Fingoes, however, were the immediate cause of the outbreak. This tribe, originally inhabitants of some portion of the country now called Natal, was driven by Chaka, the great King of the Zulus, down among the Galeakas. Here they were absolutely enslaved, and in the time of Hintsa, the father of Kreli, were called the Kafir dogs—Fingo means a dog. After one of the Kafir wars in 1834 they were taken out from among the Galeakas by British authority, relieved from the condition of slavery, and settled in locations which were given to them. They were first placed near the coast between the Great Fish River and the Keiskama; but many were subsequently moved up to a district which they still occupy across the Kei, formerly belonging and close to their old masters, the Galeakas, on land which is under the British Government and forms part of British Kaffraria.

Under British favour they have become a thriving, money-making people, possessing oxen and waggons, and going ahead of other Kafirs in the way of trade, and as their prosperity increased so did their pride. They adopted the European costume and were still called Fingoes, but a Fingo was no longer a

Galeaka's dog, which state of things was not agreeable to the Galeakas. This, too, must have been the more intolerable, as the area given up to the Fingoes in this locality comprised about 2,000 square miles, while that left to the Galeakas was only 1,600. The Galeakas living in this contracted territory were about 66,000 souls, whereas the Fingoes numbered only 50,000. The close proximity of such combustible material has been a fruitful source of trouble, and during the past year the long pent-up fury of the two tribes precipitated the war which there can be no doubt was planned, and which sooner or later must have broken out against the English. The immediate cause of the war was a row beginning by a quarrel between the Galeakas and the Fingoes in August last. There was a beer-drinking together on the occasion of a Fingo wedding to which certain Galeakas had been invited. The entertainment terminated in a scuffle, when the Fingoes drove them away. Upon that a body of armed Galeakas returned, certain injuries were inflicted, and one Galeaka lost his life. Marauding expeditions proceeded nightly to make raids upon the cattle and other property of their neighbours. This state of things continued until the party which suffered most by their depredations followed the spoor of the stolen cattle into hostile territory, coming into collision with the foe. Thus a tribal war was started, and for more than a month the Transkei remained in a turbulent condition. The Fingoes, as being British subjects, were not allowed to conduct a war on their own account; being under our protection we should fight for them. The Galeakas were armed with every conceivable kind of fire-arm and with assegais, while the Fingoes had only assegais or such arms as were permitted them to use. It thus became necessary that we should defend them. At this critical period Kreli, the old chief, is supposed to have been urgent against any further fighting, remembering well that all the misfortunes that he had suffered had come from fighting with the English. Some said that his sons and young men who had never been on the war-path were too much for him: they were most anxious to measure their strength with the English, and he could not restrain them. After all, they reasoned it might be that the long prophesied day had now come for driving the white men into the sea. Others were of opinion that the Galeakas as a body were not anxious for wars with, though they were determined to bully, the Fingoes. They had too much to lose and nothing to gain.

Presence of the High Commissioner on the frontier.

His Excellency the High Commissioner was most opportunely at this time making a tour through the eastern frontier. He crossed the Kei and sent for Kreli in the hope that he might have influenced him to maintain discipline in his tribe. The order was not obeyed; Kreli, it was said, was afraid of foul play if he put himself in the power of the High Commissioner. He kept aloof, and the Galeakas continued to disturb the peace of the country.

The Colonial Government now ordered its Frontier Armed and Mounted Police to interfere and assist the Fingoes, our subjects.

Invasion of the Fingo territory.

The Galeakas, confident in their own superiority and in the possession of fire-arms, in the latter end of September advanced an army into the Fingo territory and attacked the natives, who were supported by a troop of Frontier Armed and Mounted Police with a 7-pr. mountain gun. The action that ensued can scarcely be claimed as a success for our arms. The gun became unserviceable after being fired seven times, and had consequently to be withdrawn as quickly as possible to prevent its capture. This unfortunate circumstances was observed by the Fingoes and interpreted as the signal for a stampede, so that a somewhat disorderly retreat was made to the main body of police at Ibeka; five of the Mounted Police and one officer being killed by the Galeakas.

A few days subsequently this strong position of Ibeka, during a dense fog, was attacked by about 10,000 Galeakas. They advanced in three dense columns to the attack with considerable order and regularity, trying to outflank the comparatively insignificant force of the defenders. In this engagement the Fingoes behaved much better, so much better as to have been thanked for their gallantry; and a few well-directed rounds, telling severely on the close masses of the enemy, put them to flight.

Proclamation of the High Commissioner.

On the 5th October, when affairs were becoming serious, the British High Commissioner for the management of the natives, who is also Governor of the Cape, issued a proclamation in which he set forth Kreli's weakness in fault.

"Kreli," he says, "either had not the will or the power to make his people keep "the peace;" and again,—"The chief Kreli having distinctly expressed his "inability to punish his people or to prevent such outrages for the future, "Commandant Griffiths has been directed to advance into Kreli's country "to put down by force, if necessary, all attempts to resist the authority of the "British Government, or to molest its subjects, and to exact full reparation "for the injuries inflicted on British subjects by Kreli's people."

Frontier strengthened by reinforcements from Cape Town.

On the receipt of the alarming intelligence of what occurred at Ibeka, of the Galeakas' audacity to attack such a strong position, it was considered necessary to strengthen the forces on the eastern frontier. These at the time consisted of only the 1st battalion 24th Regiment with some artillery and engineers at King William's Town, and half a company of the former regiment at East London, amounting in all to about 800 men. Lieutenant-General Sir A. Cunynghame, who happened to be on the eastern frontier, therefore telegraphed to Cape Town for reinforcements, and 200 of the 88th Regiment were despatched without delay. In the meantime the 1st battalion 24th Regiment was thrown out in detached parties along the frontier and on the banks of the Kei in order to prevent any attempt on the part of the Galeakas to break through and desolate the outlying districts of the colony, or to join the Gaika tribe of Kafirs, with which they are intimately connected by ties of blood relationship.

The country in the immediate vicinity of King William's Town is thickly peopled by this tribe, reported to be the most warlike of any section of the race of Kafirs; and it was the danger of their rising whilst operations were being carried on beyond the Kei which was the chief source of apprehension and actual peril. For four months the dread of this terrible contingency had ever been uppermost in the minds of the rural population of British Kaffraria. Living in their midst, and having heard from old colonists, or perhaps having themselves experienced in former wars what these savages are capable of doing when their blood is up, can it be wondered at if the most dauntless amongst them left their homesteads and placed their families in places of relative security? They either flocked to the towns or congregated in the villages forming what are called "laagers."

Another source of danger was the Gaikas betaking themselves to the fastnesses of the Amatola Mountains, whose deep gorges and ravines clothed with dense thickets so long defied the efforts of our troops in 1851–52, and being joined by the Galeakas, and indeed by the disaffected and turbulents of all the Kafir tribes.

The Colonial Government raises forces and attack Kreli.

The condition of affairs being such, it behoved the Colonial Government to make every effort to crush Kreli and his people without delay. For this purpose volunteer corps were called out and Fingo levies raised, forming a colonial force, which was placed under the command of Commandant Griffiths.

The British troops at this time, not being of sufficient strength to take the field, were employed to garrison the chain of outposts formed along the frontier and the banks of the Kei, whilst the colonial army crossed the Kei and at once came into collision with Kreli.

By a series of operations executed by the combined police, volunteers, and native forces, Kreli and his tribe were soon driven across the Bashee into Bomvanaland, and his territory annexed to the British dominions.

The fact of Kreli having fled from his country was looked upon as a sign that he was subdued, and the greater portion of the volunteer corps were withdrawn from across the Kei to King William's Town, where they were disbanded amidst great rejoicing.

Colonists invited to settle in Galeaka land.

The following Government notice was shortly afterwards published at King William's Town, its date being 13th November:—"Applications will be received "by the Honourable the Commissioner of Crown Lands and Public Works "for grants of land in the westernmost portion of Galeakaland, formerly "known as Kreli's country, between the Cogha and Kei Rivers, from those "willing to settle in that country. The conditions of the grants—which will "be limited in size to 300 acres—include immediate settlement and *bonâ fide* "occupation, and may be ascertained, &c."

Thus in 1877 the British Government again attempted to do that which was recommended 20 years before.

It being the object of the Colonial Government to keep the Galeakas on the other side of the Bashee River, it was contemplated to guard the drifts by erecting forts, so as to prevent them recrossing into the annexed country; and estimates for these were sent in.

Before anything could be done, the Galeakas, finding the country unguarded, about the 18th November began to recross the Bashee; and small parties came into Ibeka and laid down their arms. They said they were tired of war and were starving. A tract of land on the bank of the Cogha was told off as a location for them; they were supplied with food and protecting certificates. The Galeakas begin to lay down their arms.

Though a large section of the tribe was now in favour of peace, still there was a war party in the midst, with Kiva, Kreli's son and heir, at their head; and it now became necessary that fresh measures should be taken to clear Galeaka-land of the disaffected.

The news of the return of the Galeakas had a most injurious and disturbing effect upon the other tribes of Kafirs, notably the Gaikas; Sandilli, their Chief, who was always drunk, was averse to war, knowing well the powers of the English, but the youthful part of the community now did their utmost to force on a rupture by committing wholesale depredations on the stock of the border farmers.

In many instances cattle that had been stolen could be spoored or tracked to a kraal, but the Government would not allow the law to be put in force against the robber, or be cattle to the retaken. At last the exasperation of the farmers reached such a pitch that they declared unless the Government put down this state of things promptly, they would take the law into their own hands and redress themselves.

On the 20th November, information having been given that a petty chief of the Galeakas named Makinnon had crossed the Kei with 200 followers and was making his way to Sandilli's country, with the view of inducing him to rise, a flying column of 100 men of the 1/24th Regiment immediately left King William's Town to intercept him, but it did not succeed, the wily chief eluding their vigilance at night and effecting his object. The column, however, remained out for several days patrolling the roads and assisting the police in trying to put a stop to the cattle-lifting now so prevalent on the frontier. Makinnon joins Sandilli.

When it became known to the Government that Makinnon was with Sandilli, he was called upon to give him up, but he made continual excuses and never did do so.

The few irregular troops that remained in the Transkei were now recalled, and the Galeakas, with the exception of Kreli, were allowed to re-occupy a portion of their territory, that lying between the Cogha and Bashee rivers. At the same time a reward of 1,000*l.* was offered by Government for the capture of Kreli. Reward for Kreli's capture.

The Gaika country had become very unsettled, and the war cry was beginning to be heard amongst them. The farmers, who had in some instances returned to their homesteads, were again leaving them. The Kafirs were buying knives and blankets at the stores, and the native servants, not only in the country districts but in King William's Town were leaving their masters and returning to the kraals at the command of their chiefs. The Gaikas are restless and disaffected.

Old colonists knew well what all this portended, and waited with gloomy apprehensions for the period of Christmas, when the remaining Kafir crops would be gathered in, and the savages would then have nothing to lose by war.

At the beginning of December the Galeakas, which were supposed to be thoroughly dispirited and beaten, again assembled together and attacked the Frontier Armed and Mounted Police and some volunteers posted on a hill called Guadana, about seven miles from Ibeka; killing two of the former and wounding six. The fact of the enemy making the attack on the colonial forces when in such a strong position showed that they were far from subdued, and did not intend to abandon their country without another struggle. Commencement of second phase of war.

It would appear that Kreli, having satisfied himself that the women and children of the tribe, together with the cattle, were in a place of safety across the Bashee River, returned with all his army, and, being unencumbered, now threatened to cross the Kei and invade the colony. Being disappointed in finding an ally in Bomvanaland, but finding only security for his belongings, he determined to try and stir up the Gaikas and get them to join him. With

this view he moved rapidly towards the Kei, and was met by the Mounted Police and some Fingo levies at a place called the Springs. Here a sharp engagement took place in which the enemy was routed with the loss of 60 killed, there being only two wounded on our side.

The posts along the Kei were now strengthened, but the Imperial troops had not yet taken the field. So grave did affairs now appear, that every available soldier was brought up from Cape Town, that station being left to be garrisoned entirely by volunteers.

Military arrangements.

The following were now the military engagements made by the Lieutenant-General commanding. In the Ciskei a chain of outposts was formed, garrisoned by British troops, and extending from Cathcart to East London; their strength being—Cathcart, 100 men; Fort Cunynghame, 60; Kabousie, 50; Komgha, 200; Impeta, 100; East London, 50. King William's Town was the base of operations, 300 of the 1/24th Regiment being left there. In the Transkei it was proposed to send out six columns—three of 200 strong and three of 100—to each of which were to be added 300 or 400 Fingoes.

Hospitals.

Three stationary field hospitals were established—one in the Ciskei at Komgha, and two in the Transkei at Ibeka and Toleni. The base hospital was made at King William's Town. Each column had its flying field hospital.

It having been decided that the Commissariat and Medical Departments of the colonial forces should be placed under the general commanding, I was directed to make the medical arrangements for the whole force.

Want of surgeons.

At this time there were only eight military medical officers in the whole of this vast command.

The Transvaal had only recently been annexed, Secocoeni threatened again to break out, and the Zulus were in a very disturbed state; therefore only two medical officers were on the eastern frontier. These, with three that the Colonial Government handed over, made five with which to commence the war. It was, under these circumstances, necessary to employ civil surgeons. At first only four could be obtained: this number was far from meeting the several requirements, as from the nature of the warfare in South Africa, regiments are split up into many small detachments, each requiring a medical officer. After a short time, however, others offered their services, but the requisite number was never obtained. They were untrained, of course, in the common routine duties of a military hospital, and could not or would not furnish the necessary returns; and some of them were not amenable to discipline. After a time, four surgeons of the Army Medical Department arrived from England, and this enabled me to place a military surgeon in charge of each stationary field hospital; whilst civil surgeons had to accompany the troops in the field.

At a subsequent period, when the war was over, 17 civil surgeons arrived in the command; they would have been invaluable and saved me much anxiety had they arrived at an earlier date.

There were no medical officers available for the special duty of sanitary officers, each medical officer was made responsible for the sanitary condition of his camp and its vicinity.

Army Hospital Corps.

The want of non-commissioned officers and men of the Army Hospital Corps was most severely felt. Hospitals had to go into the field without a single man of this corps attached to them, and there were no stretcher bearers. At the commencement of the campaign regimental bearers were applied for, for the purpose of putting them through a course of training, but the scarcity of troops did not permit of this, and natives were sanctioned instead. Consequently a number of Gaikas were put through the stretcher drill, but in the course of a few days, when there was a probability of their being immediately required, they deserted when the other native servants in the town left their masters. Fingoes were then tried, but they turned out as bad as the others. When the want afterwards actually arose untrained soldiers were employed.

Ambulances.

Application to England by the Ordnance Department for ambulances was not entertained, and the usual means of transport of the country had to be used, viz., waggons drawn by 16 or 18 oxen; these were fitted with cartels on springs slung inside the body, and accommodated two lying down and six sitting, and answered fairly well, but the roads of the country are so bad that no conceivable contrivance could entirely prevent jolting. The ox ambulances,

however, were very heavy, cumbrous, and slow in their movements, only progressing 18 miles in 24 hours, and taking four days to traverse the distance between Ibeka and King William's Town, necessitating the passing of three nights in the road, therefore some light waggons were fortunately obtained and substituted for the ox ambulances when the more rapid transport of sick or wounded was absolutely necessary.

Water. In consequence of a succession of dry summers, the water throughout the eastern frontier and Kaffraria was scarce, it therefore became necessary to take precautions against the troops making use of bad drinking water; pocket filters were therefore served out in the proportion of 10 per company, more could not be obtained in the colony. Single or double-barrel filters made by the Royal Engineers Department were supplied to camps, and Lipscombe's filters to the field hospitals. Crease's filters which had been applied for, had not arrived from England.

Special field rations. A special field ration was issued to the troops on their taking the field: it consisted of—

Fresh bread 1½ lbs., or biscuits 1 lb., or flour 1 lb.

Fresh meat 1½ lbs., or salt meat 1 lb., or preserved meat 1 lb.

Vegetables.—Fresh potatoes ½ lb., or fresh onions ½ lb., or other fresh vegetables 1 lb., or rice ¼ lb., or split peas ¼ lb., or beans ½ lb., or preserved vegetables 1 oz., or preserved potatoes 1½ ozs.

Rice was only issued as a vegetable ration on the recommendation of a medical officer. Split peas and beans were not issued when fresh vegetables were procurable.

Grocery rations.—Tea $\frac{1}{6}$ oz. and coffee $\frac{1}{3}$ oz., sugar 2 oz., salt ½ oz., pepper $\frac{1}{36}$ oz.

Lime juice. When the troops had been 14 days without fresh potatoes, lime juice 1 oz. with sugar ½ oz. was issued daily, and the issue was continued until fresh potatoes were procurable.

Rum. Rum was not issued as a ration, but only on the written certificate of the senior medical officer that it was necessary, this certificate being approved by the commanding officer.

Extra rations. When troops marched during the night or early in the morning an extra ration of coffee $\frac{1}{3}$ oz., or cocoa $\frac{1}{3}$ oz., and sugar ½ oz., and bread stuffs ¼ lb. was issued if the commanding officer deemed such issue necessary.

Early in December I received instructions to make the necessary medical arrangements for 5,000 men, including natives and volunteers, to enter the field, and these being formed into so many detachments I found, with the limited means at my disposal, the greatest difficulty in providing medical aid for them.

British troops cross the Kei. On the 14th of December the first Imperial troops crossed the Kei into Galakealand, and now active operations on the part of these troops were said to have commenced.

Naval brigade. These troops consisted of the 1/24th Regiment and a wing of the 88th Regiment, with a naval brigade consisting of about 100 seamen and marines in medical charge of Staff Surgeon Norbury, R.N. The whole brigade numbered 194, but the remainder were split up between Forts Cunynghame and Komgha.

On 28th December the Lieutenant-General left King William's Town for the Transkei. Having arrived at Komgha on the 21st, he was leaving it on the following morning when scouts came in saying that Kiva, the son and heir of Kreli, was crossing the Kei with a large number of followers, evidently with the intention of paying Sandilli a visit. It appeared that this chief had eluded the vigilance of the outposts and crossed the rivers without resistance. This delayed the general, but he was enabled to resume his journey the next day, and arrived at Ibeka without molestation.

I followed on the 24th December, and on arrival at the Draibooch Hotel and Kafir Store, about 11 miles from Komgha, when I outspanned I found the place full of Gaikas, whose defiant attitude and want of respect much surprised me; however, in the course of a short time a messenger came in from a neighbouring kraal to say that a meeting between Sandilli's councillors and Kiva was then taking place, and in a short time it would be decided whether Sandilli would throw in his lot with the Galeakas or not. On this I considered it prudent to leave the spot, and arrived at Ibeka on 26th.

Columns leave Ibeka for the Manabie Forest.

On the morning of the 28th December there was a general movement of the troops at Ibeka. Three columns went out together, taking different routes towards the Manabie Forest, where the enemy was known to be in force.

The columns were directed to clear the country as they went, and to make a simultaneous attack upon the enemy. A fourth column was to work along the Bashea and to prevent the Galeakas from crossing that river. The naval brigade was with the head-quarter column.

A column went out at the same time from Komgha, consisting of a wing of the 88th Regiment with volunteers and native levies, to scour the Chicata Valley and to capture the large herds of cattle which were known to be there on account of the excellent pasturage.

Movable field hospital cannot follow columns.

It was intended that a movable field hospital should follow as close as possible in the rear of the columns, but the conformation of the country over which the troops were operating was so irregular, consisting as it did of alternate ridges and kloofs, that it was evident it must be separated from them for considerable periods whilst making its way round from ridge to ridge; besides which it would have been highly dangerous without an escort, and this could not be spared in consequence of the paucity of troops. The general, therefore, decided that none but flying field hospitals should accompany the columns, and that the other field hospitals should be stationary: one at Ibeka, which is situated 95 miles to the N.E. of King William's Town, and where the general had made his head quarters for the time being; another at Toleni, about 23 miles nearer the sea, and the remaining one at Komgha, 21 miles still nearer King William's Town.

The field hospital at Ibeka was so arranged that it could be split in two should the enemy take to the open country, when it could keep up with the column. But this was never the case, the Kafirs preferring to keep near the wooded ravines called kloofs, into which they could retreat when hard pressed.

As the nature of the country was such as to preclude the employment of wheeled vehicles in many places—in fact, with the exception of the high road between King William's Town and Ibeka, there was no such thing as a road according to the common acceptation of the term, but mere tracks—it was a question how the wounded were to be carried from the first dressing station to the ambulances, which might be some distance away. Ashantee covered cots had been constructed, but a difficulty arose as to the bearers, the natives being unaccustomed to anything of the kind, and they were laid aside. Crimean cacolits and Surgeon-General Longman's litters were then thought of, and eventually a supply of each arrived from England; when tried, however, no horse could carry them, the Cape horses being small, low in the shoulder, and narrow chested. The ordinary stretchers had to be resorted to. In the course of a few days the columns returned to Ibeka, having found the Manabie Forest empty. The fourth (Elliott's) column, however, came into collision with the enemy on the other side of the Bashee, probably on their evacuation of the forest, and one policeman was dangerously wounded and afterwards died.

Rising of the Gaikas in rebellion.

On 30th December the Gaikas under Sandilli at last rose in rebellion. They commenced by burning down the Draibooch Hotel and Store, which was only a few miles from Sandilli's kraal, and was a favourite place of resort of his immediate followers. Why they should have done this is strange, the more so as they gave the proprietor 12 hours' notice to enable him to remove all his property. After destroying the building they laid in wait for the Mounted Police which passed daily with the mail bags on their way to and from the Transkei, attacked, them and killed one, carrying off his body. The attention of the garrison at Komgha, a few miles distant, having been called to the burning of the hotel, a company of the 88th Regiment, under the command of Major, now Lieutenant-Colonel, Moore, with some mounted police, immediately left for the spot just after the police post had been attacked. The troops were at once ordered to advance against the Gaikas, who were between 200 and 300 in number, and a very sharp engagement took place, in which Colonel Moore, 88th Regiment, was wounded by an assegai through the arm, two men of the 88th and one of the police were dangerously wounded; one of the 88th and the latter dying on the following morning.

Attack on the mail.

The next day another attack was made by the Gaikas in the same neigh-

bourhood upon the post, which now was accompanied by a strong mounted escort; *110 of the 88th, and 50 mounted police were soon on the spot, and some hard fighting took place, 3 of the 88th being dangerously wounded, 1 afterwards dying, and 1 policeman, who also died. After this engagement 3 men of the 88th were missing. One of them being sick had been placed in the hospital cart previous to the attack, and this, which contained the medical and surgical materials, was also missing. It is supposed that the bullocks took fright at the firing, and ran off with the carts. Surgeon Macartney was in medical charge of the troops, and lost his horse, which was tied to the cart. The following day 2 men of the 88th turned up in camp at Komgha; the body of the other missing man who was in the cart, however, was found three days afterwards in a mutilated condition, also the body of the policeman killed in the first engagement, but it was not mutilated.

Posts were now established at Malins Mission Station, about 25 miles east of Ibeka, and at Quintana, 17 miles to the south-west. Post established at Malins and Quintana.

The Komgha column came into collision with the enemy in the Chocata Valley, and captured a large number of cattle, one man of the 88th being dangerously wounded, and afterwards dying. It returned to Komgha on the 4th January.

The Galeakas at this time sent into Ibeka to say that they wished to lay down their arms, and a batch of about 300 did on the next day; they looked in a miserable, starving condition. Many of them, however, were afterwards killed in action, and the passes given to them by the magistrate were found on their bodies. Parties of Galeakas lay down their arms.

The Gaikas now made an inroad into Galeakaland, and the head-quarter column, which had gone to the mouth of the Bashee, was recalled to Ibeka, and the post at Malins was temporarily abandoned, to enable its garrison to go to Idutywa to reinforce Elliott's column there. The Gaikas cross into Galeakaland.

On the 13th January the head-quarter column under Colonel Glyn started to join the troops at Quintana. The combined forces having been ordered to act against the Gaikas which had joined a party of Galeakas, and were in the neighbourhood between the Cogha and Kei rivers. The forces were to co-operate with the column from Komgha on the other side of the Kei, so as to hem them in, and take them prisoners. The head-quarter column had no sooner arrived at Quintana than Owen's column, which shortly before had left camp to reconnoitre, was attacked by the enemy, which was in great force about two miles distant. After a desperate engagement, in which the Kafirs showed great bravery, coming within 30 yards of the 88th, they were repulsed with much loss. On our side there were none killed, but five wounded, all from gunshot, four being men of the 88th, the remaining one being a Fingo. In this action the want of men of the Army Hospital Corps was much felt, there being no regular stretcher bearers to remove the wounded from the field. It was late at night when they were brought in by the civil surgeon in charge. Early on the following morning I proceeded with Surgeon-Major Cuffe from Ibeka to the camp at Quintana, and had the wounded transferred to the stationary hospital at Ibeka. One of the wounded was a young soldier of the 88th, who was shot from behind through the middle third of the right thigh by a Martini-Henry rifle, completely smashing the bone, and necessitating amputation above the upper third of the femur. He ultimately did well. Action of Quintana.

The enemy was followed up next day, but not found; the spot, however, where they had re-crossed the Kei was discovered by tracks of blood from their wounded. The Komgha column on the other side were more fortunate, for they came upon their rear, attacked them, and captured several thousand head of cattle; no engagement of any importance taking place, two volunteers and two Fingoes only being seriously wounded.

The Gaikas having returned to their own district, the columns came back from the Kei and patrolled the southern part of the Transkei, hoping to find the Galeakas that took part in the action of Quintana. Finding no enemy they returned along the west bank of the Bashee to Ibeka. Colonel Glyn, with the mounted men only, now went to a place called Leslie's Mission Station, about nine miles south-west of Ibeka, where the Port Elizabeth Volunteers had taken up a post for the purpose of intercepting any Gaikas which should come up from the Cogha river.

Ibeka threatened

On the 20th January there was a report that the Gaikas had again crossed the Kei, were assembling at Toleni, and were meditating an attack upon Ibeka. The garrison was consequently strengthened, and Rainsforth's detachment, which had gone from Malins to Idutywa, was called in. It was, however, a false alarm; no attack took place.

Diarrhœa prevalent.

At this period diarrhœa made its appearance amongst the troops, due probably to chills caught at night, the difference in temperature between day and night being very great; also in a great measure to bad drinking water obtained at some of the halting places, where the streams were very low in consequence of the long drought, and the water being more or less impure.

The wearing of cholera belts and woollen shirts was now most strictly enforced.

Colonial Government change their views.

About this period a change took place in the views of the Colonial Government in regard to military arrangements. They considered that the war with Kreli being outside the colony should be conducted with Imperial troops; whilst the rising of the Gaikas, who are colonial subjects, being a rebellion, it was the duty of the colony, having a responsible government, itself to put it down.

The Cape Colony raise troops.

The Colonial Government now raised 4,000 troops, consisting of volunteers and native levies, and these were placed directly under the War Minister, as he was called, or either styled himself.

The operations in the Transkei were now confined to the capture of cattle, several thousands of them being brought into Ibeka; the enemy on every occasion disappearing before the troops, evidently being disheartened and tired of fighting.

Return of all the troops in Transkei to Ibheka.

On 23rd January the whole of the troops were brought back to Ibeka for the purpose of the general inspecting them, and I had an opportunity of seeing them.

The men had not suffered from their long and arduous marches, their exposure and privations, and appeared fit again to take the field.

A report was now circulated that Kreli was again assembling an army, and intended to attack Ibeka. Probably the withdrawal of troops to this place had impressed him with the idea that they were about to be taken out of the Transkei, and he came back into his territory. At any rate, on columns being again sent out, he was not to be found. Detachments, however, were left at Quintana and Malins.

Withdrawal of Imperial troops from Cathcart and Fort Cunynghame.

At this time, agreeably to the wishes of the Colonial Government, the Imperial troops, which had for several months been stationed at Cathcart and Fort Cunynghame, were withdrawn; and this appears to have emboldened the natives living in the neighbouring district, for now the emigrant Tambookies, another of the Kafir tribes located to the north-east of Queenstown, rose in rebellion. This being considered a colonial affair, colonial troops under Commandant Griffiths were sent against them, and their chief was captured.

Dual arrangement perplexing.

This dual arrangement of having two armies in the field, fighting under the orders of different commanders, for the most part operating independently, but at times co-operating, was very perplexing in a medical point of view; for instance, on one occasion Brabant's force (colonial) was operating in the same part of the country with Lambert's column (Imperial), when several men of both forces were wounded, two volunteers and two Fingoes dangerously. These were taken to the hospital at Komgha, and afterwards transferred to King William's Town. On arrival the question arose as to whether the Fingoes should not be sent to the civil hospital, where there is a native ward, and only the volunteers admitted into the base hospital. It was decided, however, by the Deputy Adjutant-General that as the volunteers belonged to the Colonial Government, they must go to the civil hospital, and the Fingoes, being native levies who were fighting with our troops, should be received into the military hospital.

Return of general and staff to King William's Town.

On the 25th January the general and his staff returned to King William's Town. En route I took the opportunity of inspecting the field hospitals at Toleni and Komgha, also two new posts that had been formed at Port Wellington and Kei Road Station.

Fight at Tala and Inyeni.

The troops at Quintana, whilst out patrolling on the 29th January, had a fight at Tala in the morning, and another at Inyeni, in the vicinity of Quintana, in the afternoon; one of the naval brigade and several Fingoes were

severely wounded. Only one, however, of the latter was admitted into the field hospital, the other Fingoes having gone to their homes. This was the usual practice, as they preferred being treated by their witch doctors and doctresses.

Area of rebellion increases.

The area of the rebellion and wars continued to increase. Tribes which before had not been suspected of disloyalty now began to rise. A peculiar feature of this war has been the want of union amongst them; instead of rising simultaneously, they appeared to wait until a tribe was subdued before another rose.

Enteric fever occurs at Quintana.

Several cases of enteric fever now occurred at Quintana. The medical officer in charge of the station, a civilian, supposed the disease to have originated either from the polluted state of the air or contamination of the water in consequence of a number of carcasses of Kafirs and cattle having been left in the vicinity of the camp unburied since the late action. On his reporting the circumstance, immediate steps were taken for their burial, and no fresh cases occurred.

Reinforcements from England.

On the 9th February a field battery of artillery and the 90th Regiment arrived to reinforce the troops in South Africa; the former with five companies of the latter at once proceeded to King William's Town; the remaining three companies of the 90th going direct to Natal, in consequence of the alarming news received from the Zulu border.

The operations in the Transkei from this time consisted almost entirely of patrolling the country; a large number of cattle being captured on most occasions, but the enemy not seen. The column at Komgha generally operated at the same time in the Chicata Valley, scouring the whole neighbourhood, and carrying off numbers of cattle.

Increased accommodation in base hospital.

In consequence of the increase of sick which took place about this time it was found necessary to increase the accommodation in the base hospital at King William's Town, and for this purpose a building called the Lower Engineer Barrack, situated close to the hospital, was handed over to the Medical Department. It accommodated 42 additional patients, and, supplemented with marquees, was sufficient for the emergency.

I should mention that nearly one-third of the sick belonged to the auxiliary forces.

The increase of sickness was due principally to diarrhœa, dysentery, and fever generally of the common continued type, caused probably by exposure to a scorching sun, to exceptional heat arising from the absence of the usual thunderstorms which occur at this season, and to fatigue consequent upon long and arduous marches under such circumstances.

Special issue of rum.

Although rum as a ration was strictly prohibited, and the good health of the troops was attributed to enforced abstinence from spirituous liquors, still when the men were fagged and jaded after the day's march, and perhaps were wet through and miserable, rum was issued on the recommendation of the medical officer.

Increase of enteric fever.

In the latter part of January some cases of enteric fever, occurring amongst irregular troops at Blanes Farm, were admitted into the base hospital at King William's Town, and shortly afterwards the disease made its appearance amongst the regular troops quartered at this station. Enteric fever was prevalent at the time in the town and especially at a place called the Sheep Wash at the lower end of the town, the sanitary state of which was of the worst description. The Mounted Police and colonial troops quartered in the neighbourhood had 20 cases amongst them, infection being distinctly traced to the men fetching their drinking water from a certain pool close to the camp, although good water was daily brought for their use from the Buffalo River, and they were warned of the consequences.

Sandilli supposed to be making his way to the Waterkloof.

Sandilli with his army was now said to be making his way to the Waterkloof, the stronghold of Macomo during the last war, and where the natives fought with such desperation, causing such a sacrifice of life.

A force is sent to clear the Beaufort district.

It was the object of the general, therefore, to intercept him if possible, and for this purpose he despatched the battery of artillery and five companies of 90th Regiment, recently arrived from England, under the command of Colonel Palmer, and in medical charge of Surgeon-Major Alcock, to Fort Beaufort.

They arrived at this town on the 17th February, and were joined by the Adelaide Volunteers and 350 native levies.

Previous to the outbreak, Tini Macomo was residing in the Kerumo range in the Beaufort district. In the month of February it was reported that a body of rebels were collecting in the Schlem and Waterkloof, and as no satisfactory explanation of their presence could be obtained from this Chief, it was decided to drive them out.

On 3rd March, the forces being formed into three columns, the operations commenced, and by the 17th April the whole of the Fort Beaufort district was virtually cleared.

On 4th March a column composed of 350 Europeans, 70 Native Police, and 300 Fingoes made a night march, and reached Tini Macomo's village at Blinkwater at daylight on the 5th, and surrounded the huts. Macomo himself was absent, but many prisoners were made, the rebels' cattle taken, and their huts burnt.

The Upper and Lower Schlemkloof were then attacked and the rebels driven out; many women were taken and 250 head of cattle captured. Trusting that the success of these operations would have an effect upon the Kafirs, the special commissioner opened communication with the rebels in the Waterkloof, in order to give them a chance of submission, but to no purpose, so that an attack upon the Waterkloof was made by the whole force. They operated in three different directions, the main body being commanded by Colonel Palmer. As the Kafirs retired before our forces, they came under the fire of the guns on the eastern ridges, and it is believed must have suffered heavily. The kloof and bush were swept clear of the enemy, and all their cattle taken. Large stores of provisions and blankets found in the caves of the various kloofs were brought away by the troops. The Waterkloof was thus thoroughly cleared of the rebels without any casualty on our side. The clearing of the locality is stated to have had a salutary effect upon all the native inhabitants in the Stockenstroom district.

Colonial Government make medical arrangements for a portion of its forces.

At this period it was decided by the Colonial Government, the ministry having been changed, to conduct its own medical arrangements for that portion of the forces which it had placed under its own commandant-general; but all irregular troops and native levies co-operating with Imperial troops were still under my supervision, and these in a short time forming by far the greater portion of their forces in the field, their medical department was in fact little more than a name.

General Sir A. Cunynghame relieved by Lieut.-Gen. the Hon. F. A. Thesiger.

On the 4th March, General Sir A. Cunynghame, G.C.B., was relieved by Lieut.-General the Hon. F. A. Thesiger, C.B., who immediately assumed command.

Sandilli between Keiskama and Izeli.

By the accounts on this date, Sandilli was with a large body of Kafirs in the bush between the Keiskama and Izeli.

The Lieut.-General, with the assistance of the Colonial Government, now took steps to try and prevent them moving from their present position until sufficient forces could be collected to drive them out of it.

Kreli returns across the Bashee again.

As regards the Transkei, the constant patrolling and the formation of a chain of posts through the country caused Kreli to retire across the Bashee, with a view, it was affirmed, to recruit his army.

Further reinforcements of troops.

The Imperial forces were on the 8th March increased by the arrival at King William's Town of the 2/24th Regiment, three companies of which were immediately despatched as follows: one to Keiskama Rock, one to Bailie's Grave, one to Fort White.

Disposal of medical officers.

There being only one medical officer, a civilian, at my disposal, he was posted at Bailie's Grave, with instructions to give every assistance in his power to the detachment at Keiskama Rock, 16 miles on his right, and to that at Fort White, 12 miles on his left.

It was now arranged that the Imperial and colonial forces should make a combined attack upon Sandilli's position when everything was complete.

To provide surgeons for the forces about to be engaged, I found much difficulty. Four at least were required over and above those with the troops; it was decided, therefore, that the surgeons from the four nearest outposts to the scene of operations should proceed at a moment's notice to join the forces, and return immediately the affair was over, probably in three days. It so happened they never returned, one set of operations led to another, and they could not be spared, consequently their late posts were left without medical aid for a considerable time.

Up to this period an unprecedented drought was experienced, but now heavy rains came on and continued for a week. Diarrhœa and dysentery became more prevalent in consequence, especially amongst the irregulars. The soldiers of the 90th Regiment, for the most part youths, were reported by Surgeon-Major Alcock as being "very healthy, notwithstanding the privations "and hardships they had undergone whilst operating during the late inclement "weather in the Waterkloof." They appear not to have suffered from diarrhœa to the same extent as the troops operating elsewhere. Exceptional weather.

From the 10th to 17th March, a cordon of posts having been formed around the Perie Bush in the Buffalo Range, to which Sandilli with about 1,000 followers had betaken himself after eluding the colonial forces in the Thomas River district, the troops were busy patrolling, and several skirmishes took place between that portion of the colonial force which was operating with Imperial troops and the enemy, resulting in much loss on the side of the Kafirs and the death of an officer of Bowker's Rovers, with one officer and four men of the George Volunteers wounded. Driving the Perie Bush.

On 17th March the various troops were in positions assigned to them :—

Colonel Degacher, 2/24th, Quingwa Post, with 200 infantry, 10 mounted, two 7-pr. guns; Commandant Schermbrucker, Isidingi, 269 mounted Europeans, 400 natives; Commandant Frost, Fort Merriman, 488 mounted Europeans, 209 natives; Colonel Wood, V.C., C.B., Keiskama Rock, 65 infantry, 210 mounted, 125 natives; Commandant Brabant, Bailie's Post, 162 mounted Europeans, 125 natives; Colonel Law, R.A., Perie Mission Station, 290 infantry, 46 mounted, 300 natives, two 7-pr. guns.

The force under Colonel Law was strengthened by 29 sailors with two 24-pr. rockets and 32 marines. A combined attack was to take place on the 18th.

The number of Kafirs in the bush had been daily increasing; report placed them at from 3,000 to 4,000.

As Sandilli had made a long stand in this part of the country during the last war, it was the general's object to prevent any permanent occupation by the rebels of the same district. At the same time it was of the greatest importance that they should be prevented from going further west into the colony and spreading rebellion among those whose loyalty was of a doubtful nature.

In bush fighting a force of Europeans must always be largely supplemented by natives, the latter first entering the bush, and when the enemy is found, then to let the white man attack them.

On the 18th March Colonel Wood was to direct the advance, supported on the right and left by Commandants Brabant and Frost, but owing to too great eagerness on the part of Commandant Brabant, he attacked the enemy before Colonel Wood had arrived, thus the original plan of advance was frustrated.

On the following day the operations were renewed and the enemy driven as intended, while the upper valley was shelled from Haynes Mill.

On the third day fresh dispositions of the forces to the south and east were made in order that a final attack should be made, but on the following morning the volunteers were seen returning from the plateau, and when asked the reason, they gave difficulty of obtaining rations. Their term of agreement, it appears, had expired, and they were anxious to leave for their homes, where they had left their wives and families, their property and farms, almost unprotected.

The loss during these operations were two officers Diamond Field Horse killed; one officer and four men Fingo levy, one man Brabant's Horse killed; one Brabant's dangerously, and two severely wounded; five severely and four slightly wounded of the Fingo levy; all these latter going to their homes to be attended by their witch doctors.

The ground over which these operations were carried was at one place so rugged, rocky, and precipitous that Europeans could not go into it with the slightest chance of success, and the Fingoes had to be employed; they were most unwilling to do this until told that if they went into the bush and scoured it thoroughly they should have all they captured, besides which Sandilli was in the bush, and 500*l.* was offered by the Colonial Government for his capture.

The bush was thoroughly cleared of Kafirs, but Sandilli was not found.

On the 22nd March two companies of 2/24th Regiment and two guns under Colonel Degacher arrived at Isidingi, and a road was cut through the bush to enable the guns to move up the mountain.

The same day the enemy was observed in considerable numbers on the plateau from whence the attack was made three days before, thus showing that no effort had as yet been made to break out in any force. It appeared that the enemy were drilling, and it was supposed that Sandilli was still in the kloof with a considerable following.

During the operations in the Perie Bush the general and staff took up their quarters at the Perie Mission Station, and I accompanied him when visiting the positions taken up by the troops from that place to Tala. Imperial troops were not engaged in the first day's operations, therefore I was enabled to comply with the request of the senior medical officer of the colonial troops for the loan of an ox ambulance to convey his wounded to King William's Town, no such things having been provided by the Colonial Government. Although our troops went into the bush with the Fingoes during the operations on the following day, no casualty occurred amongst them.

The troops bivouacked on the spot each night, so as to be ready to commence the attack upon the bush at dawn and surprise them, to prevent their women bringing them food, and to capture their cattle, which were sent out to graze in the early morning.

Enteric fever amongst the colonial troops.

Enteric fever now became prevalent amongst the colonial troops which were acting with the British troops, especially the Frontier Armed and Mounted Police.

As regards the latter force this was not to be wondered at, for their organization was faulty, they were little looked after by their officers, and they received no rations, a sum of 2*s*. per diem being allowed them instead; with the younger men the money was generally spent in purchasing sardines, jams, &c., many of them seldom touching meat. Their physique consequently was lowered, the privations and hardships which they underwent told severely upon them, and their systems were only too ready for the reception of poisons lurking in the air and water. Several deaths occurred from this disease in the police, and recruits from England for the force became alarmed when ordered to the front.

Few cases of enteric fever up to this period had occurred amongst the regular troops.

Active operations suspended for a time.

The volunteers and native levies having left for their homes, active operations were suspended, and the regular troops retired to their respective camps, as they were unable to work in the bush without the Fingoes.

The general and staff returned to King William's Town, and remained there until the 27th March, when a sufficient number of volunteers and Fingoes having again been collected and everything being ready for another attack on the enemy, active operations recommenced. The general again went out to command in person, taking up his quarters at Mount Kemp, situated on the plateau of the Buffalo Range, whilst his staff remained at Haynes Mill.

Active operations recommence.

On the 28th March the forces under Colonel Wood, Lieutenant-Colonels Degacher and Law, Commandants Frost and Schermbrucker, Lieutenant-Colonel Warren, and Captain Sanson were in positions occupying parts surrounding the Kafirs under Sandilli. 1,000 Fingoes expected from the Transkei on this date, when it was arranged to attack Sandilli, did not arrive until the 3rd April, so that the plan of operations was seriously disturbed. On the above date the enemy showed themselves in considerable numbers on the open ground between the Gozo Heights and the precipice west of Haynes Mill, and an attack was ordered on the following morning.

The combined movement was carried out, but the Kafirs made no stand, and almost without resistance deserted a position which, if properly defended, must have entailed a considerable loss on our side. The troops encamped upon the position taken, and the Kafirs were thus confined to the bush of the Buffalo Poort Valley. The bush was of such extent that it was useless to attempt to beat it until the arrival of the 1,000 Fingoes from the Transkei. All that could be done in the meantime was to keep the Kafirs in and prevent their obtaining cattle and other supplies from the outside. To assist this the

Indian corn gardens in the vicinity of the forest were destroyed; constant raids into the bush and on parties endeavouring to escape or drive in cattle were made; roads were cut through the forest where only tracks before existed, and new paths opened out through those parts where communication through our posts was most difficult or necessary.

The effect of these last-named works was looked upon as most important. Although, owing to the delay in the arrival of the 1,000 Fingoes, it was evident that a large proportion of the rebels had slipped away in small parties from the bush that was being surrounded, still it appeared desirable to show the rebels that it was possible for our forces to penetrate into and thoroughly search what has long been believed by them to be an impenetrable fastness.

Arrival of 1,000 Transkei Fingoes on the scene of action.

On the 3rd April the Transkei Fingoes arrived, Mr. Ayliff, the chief magistrate in Fingoland, having been forced to accompany them himself owing to their unwillingness to leave their homes, the reason given being that they had become rich and independent from the spoils of the Galeaka war.

A day's rest was necessary for these men, as it was found they had pushed on by forced marches, 53 miles having been marched in one day.

Arrangements were made for driving the Buffala Poort Bush on the 5th April. On this day the various paths cut through the forest and all points of egress were lined and held by the European portion of the force, while the whole of the Fingoes, to the number of 1,777, led by European officers, drove the bush in a southerly direction. As an evidence of the difficult nature and extent of the ground to be traversed, although these men entered the higher part of the valley at 6 a.m., they only emerged at the end at 5 p.m.

A few Kafirs were seen, and almost all of these were killed. The delay in driving the bush had no doubt enabled the rebels to escape in small parties and in different directions.

Fresh bands of rebels belonging to other tribes of Kafirs are in the neighbourhood of Tata Ndoda: arrangements made to attack them.

The force around the Buffalo Range was about to be broken up after this operation, but information was received of the presence of large bodies of Kafirs belonging to Jali's, Siwani's, Kama's, and Seyolo's tribes (who had just broken out in rebellion) in the neighbourhood of Tata Ndoda. A portion of these rebels had been attacked by a force consisting of 75 of the Diamond Field Horse under Lieutenant-Colonel Warren, who had routed them with considerable loss, 58 of the enemy having been counted in one spot outside the bush, and 300 cattle taken. The movements that it was necessary to make with the view of preventing these fresh bands from penetrating north into the Amatolas entailed very considerable fatigue on the troops, who had already gone through a hard day's work in the bush.

A small force under Lieutenant-Colonel Law, consisting of two guns N Brigade, R.A., and one company of 2/24th Regiment were at once despatched to Perie, with orders to leave that station at daybreak the following morning for Bailie's Post.

The Transkei Fingoes marched at 1 a.m. the next morning towards the same post, whilst instructions were sent to Colonel Wood to move the whole of his force from the heights the next morning, and to march with his mounted men and Fingo levies by the valley of the Ratala to the neighbourhood of Burns Hill, when he would be in a position to stop any attempt on the part of the rebels to force their way into the Amatolas.

It was arranged that an advance to the attack of the rebels should be made from Bailie's Post at 12 noon.

Two guns and a company of 2/24th were moved by Lieutenant-Colonel Law to the south of Tata Ndoda Hill. The bush was shelled at noon and cleared without difficulty. It was then discovered that some rebels were occupying the Tutu Bush, which lies on the south side of the Tata Ndoda. This was attacked by the first division of Transkei Fingoes, 500 strong, under Captain Wyner, who entered the bush from the south and west. The Kafirs made an obstinate stand and drove them out of the bush, killing Captain Webster of the division whilst gallantly leading on his men. At this moment Colonel Wood's force of the 90th Regiment, and Captain Emmett's company of Hottentots, opportunely arrived on the ground.

After the repulse of the first division, the second division Transkei Fingoes were ordered to drive the bush from west to east, but without success. Commandant Roster collected two or three companies, however, and by personal example and courage succeeded in clearing that part of the bush which had

been previously attacked by the first division. He only returned in consequence of failing light and want of ammunition. So far as could be ascertained, the enemy's loss on that day was 41 men, among whom were two sons of Seyolo. Our loss was 1 officer and 2 Fingoes killed, and 29 wounded severely. The loss reported by Colonel Wood's force was 28 killed; having 1 killed and 11 wounded on our side. During the night of the 6th the rebels broke away in different directions. About 7 a.m. on the 7th, 150 to 200 passed near Bailie's Grave into the Perie Bush, 2 guns Royal Artillery and 2 companies 2/24th moved out to intercept them; the Transkei Fingoes at the same time beat the bush from the Tata Ndoda to the same point, killing 8 Kafirs, and capturing some cattle and horses; 1 man of the 2/24th was killed. Colonel Wood's force, resuming the position he had occupied on the 6th, drove the Tutu Bush, killing 44 Kafirs, among whom were 2 chiefs (Jali was supposed to be one of them).

Volunteers' terms of engagement expired.

The bands of rebels appeared now to be for the time demoralised and dispersed. The opportunity was taken by the general to return to King William's Town to make arrangements for the replacing by new levies the volunteers who were daily leaving in consequence of the three months' engagement having expired.

A portion of troops return to King William's Town.

The operations being temporarily stopped for the reason stated, 2 companies of the 2/24th Regiments with a battery of artillery returned to King William's Town, leaving the outposts with a reduced number of troops.

Beaufort district left to the care of colonial forces.

The Beaufort district continued quiet, and was left entirely to the care of the colonial forces.

District between Buffalo and Keiskama generally disaffected.

In the district between the Buffalo and Keiskama rivers, the Kafirs belonging to the tribes of Seyolo, Kama, and Jali have now generally taken the field against us. Siwani up to this time proved faithful, but some of his tribe joined Seyolo.

Commandant Von Linsengen, who was placed in military charge of the district, lost no time in attacking the enemy, and by his energetic action, succeeded in driving the rebels completely out of that district.

Attack on rebels in Thomas River district.

In the Thomas River district, Commandants Frost and Schermbrucker attacked the rebels that were constantly passing through it; at Xaxazali and in Dohne Bush, 26 of the enemy were killed, and 19 horses taken. Lieutenant Bellairs, of the Stutterheim Volunteers, was severely wounded, and 1 Fingo wounded. A further search of the bush was made on the 19th April, when 4 Kafirs were killed and 4 horses taken. In the Transkei all remained quiet; the usual patrolling through the country continued at intervals. Three permanent outposts consisting of earthworks were now formed in Galeakaland for the purpose of supervision and preventing the return of the Galeakas, who were still in arms against the Government. These were situated at Quintana, near the base of the mountain of that name, the highest point in the Transkei; Malins Mission Station, where there was a detachment for a short time on a former occasion; and Beauchamp Wood, a new post 50 miles to the south and east of Ibeka, 15 miles from the Bashee, and 4 miles from the sea. Idutywa, on the high road from Ibeka to Natal, and 30 miles from the former place, continued to be occupied by troops. Also at the mouth of the Bashee River a company of the 1/24th was temporarily encamped; it was changed weekly. This plan not only served the purpose of a patrol, but it afforded the men a change to the seaside, which was beneficial to their health.

Permanent outposts established in Galeakaland.

It will be seen that over a large area within the compass of the colony armed rebellion existed.

Captured women and children sent to King William's Town en route to Cape Town.

A large number of women and children were either captured or came in voluntarily, and were immediately despatched to King William's Town en route to Cape Town, where they were to be detained until hostilities were over. Although this measure appeared harsh, still it was the best for all; it not only tended to cut short the rebellion by preventing supplies of food, &c. being carried to the men, but it undoubtedly saved many lives, as these poor creatures were in a pitiable condition from exposure and want, and many of their children were on the verge of starvation.

At this period Gongatella, chief of the Tambookies, with 13 of his immediate followers, gave himself up near Queenstown.

The losses of the enemy during the last 14 days must have been very great. From the reports and returns of the various commanding officers they

amounted to 500 killed, 14 wounded, 32 prisoners, 1,600 head of cattle, 99 horses taken. Our losses were 1 officer Fingo levies killed, and 12 men wounded, 1 private 2/24th killed, 1 private Diamond Field Horse wounded, 1 officer George Volunteers wounded.

Increase of sickness amongst the troops.

Sickness amongst the troops was now increasing, the regulars being equally affected with the irregulars. Diarrhœa and dysentery were the prevailing diseases, due to exposure to damp and cold at nights, and the want of waterproof sheets, a supply not having been sent from England with the last regiment. The regulars had not each man a waterproof sheet, and the irregulars had none at all. Bowel complaints, at this the autumnal season always prevalent, were especially so this year in consequence of the long drought being followed by late rains. Cases of enteric were also more frequent, and now the disease was not confined to one force more than another, or to the troops more than the civil population, or to any particular locality, every part of the eastern frontier and the Transkei appearing to suffer from it alike.

A more permanent field hospital established on south side of Buffalo Range.

It being the opinion of the general that Sandilli would remain in the Perie Bush for some time, and that the investment by the troops of this stronghold would be continued for an indefinite period, it was considered desirable that a more permanent field hospital should be established somewhere on the south side of the Buffalo Range. A deserted building called Brown's Farm, lately used as an outpost by the Keiskama Volunteers, was inspected and found very suitable for the purpose; there was a good stream of water close by, and a garden in which convalescents might lounge. It was situated about 24 miles from King William's Town, with a good road between. The only difficulty was its exposed position; it was 3 miles away from any camp, and a strong guard could not be spared. However, the general was most anxious that a hospital should be established on the spot, and equipment was sent out, a civil surgeon being placed in charge, there being no military medical officer available. Being near the principal route taken by the rebels when passing from the Tata Ndoda to the Perie Bush, it was after all never used until the rebels were finally driven out of the Tata Ndoda, and a detachment of troops was quartered on the spot for the purpose of guarding a road which Colonel Wood had made for taking the field guns up the Buffalo Mountain to Fort Gozo on the summit. Surgeon-Major Alcock was now placed in charge of this hospital, he being at the time senior medical officer of Wood's column. The hospital proved most useful, several severe wounds having been admitted into it, one requiring amputation at the shoulder joint which did well.

Fingoes now claim the privilledge of treatment in a military hospital.

In consequence of a number of wounded Fingoes having been transferred to King William's Town, the number of patients in the base hospital at this time rose to 134, of which 43 were irregulars. The Fingoes now appear to have found out the advantage of our system of surgery and the general treatment of the wounded over their witch doctors, for at first their wounded disappeared in a marvellously quick manner shortly after an action, and if found, could not be induced to enter a hospital; whereas now they almost claim the privilege, and when once admitted are with difficulty got rid of.

The native levies were always treated in tents erected for the purpose, as their habits are so dirty they could not be placed in wards. It was the greatest difficulty to find a native that would attend upon the wounded of his own colour. A man would accompany his wounded brother to the hospital and perhaps remain with him for a few days, but he would not look after him and dress his wounds; they appear to have a dread of touching a wound lest they should be infected. At last a school Kafir was found to perform the duty of nurse.

Active operations suspended.

The rebels gained courage and re-assemble.

For a fortnight no active operations were undertaken against the rebels, the number of colonial troops under the lieutenant-general having been much reduced owing to their three months' engagement having terminated; the result of which is that the rebels have gained courage, and have collected in the same tract of country where the late operations took place, viz., the Tata Ndoda and the Buffalo Range. They burnt the Fingo kraals near to Bailie's Grave, and stole some cattle, otherwise they did not show any activity.

When the Beaufort district was given up to the care of the colonial forces, the five companies of the 90th Regiment were removed to Alica, but it being unnecessary to retain the Imperial forces in this part of the country any

The 90th ordered from Alice to Tata Ndoda.

longer, more especially as there was no lack of colonial forces there, to be called out if necessary, the 90th was ordered to the neighbourhood of the Tata Ndoda to take part in the coming operations against Seyolo and Sandilli.

Probability of unusual number of casualties.

As it was considered very probable that there would be a large number of casualties during the expected fight at a place called the Makabatele Pass, which the 90th was to take, every arrangement for the proper care of the wounded was made by Surgeon-Major Alcock in medical charge.

This medical officer found that the pack-horse and panniers could not accompany the troops through the narrow paths in the bush, and that the weight of the field panniers was too much for the horse; he therefore left them behind, and took on with him leather wallets filled with the medical and surgical materials most needed at the first dressing place.

Active operations resumed, and the rebels in the neighbourhood of the Tata Ndoda attacked.

All the arrangements for again taking the field being completed the general and staff proceeded on the 29th April to Bailie's Grave, in the vicinity of the Tata Ndoda; the two field guns and the company of the 2/24th Regiment going out from King William's Town to the scene of action at the same time.

As before stated, the rebels had collected in the Buffalo Range and Tata Ndoda. It was determined to operate in the latter district first, and this intention was concealed from the enemy as far as the various spies everywhere would permit; indeed it would appear from the various reports received that they believed the Buffalo Range would be the first attacked.

The troops—consisting of Lieutenant-Colonel Degacher's Column, 60 Royal Artillery with 4 guns, and 320 2/24th Regiment; Colonel Wood's, 36 Royal Artillery with 2 guns, 400 90th Regiment, 118 Diamond Field Horse, 1,000 Fingoes; Commandant Von Linsengen's, 60 Humansdorp Volunteers, 76 Graham's Town Volunteers, 40 Vincent's Horse, 39 Panmure Volunteer Horse, 105 Buffalo Volunteer Horse, and 800 Fingoes; Major Buller's, 80 Frontier Light Horse, and 75 1/24th Regiment, Maclean's Fingoes 600, and 175 Cowley's Horse—being in position at the several posts in the neighbourhood, viz., Bailie's Post, Burns Hill, Yellow Wood Drift, Debe Neck, Fort White, Makabatele Neck, Figlands Farm, and Green River, on the 30th April, at 5 a.m., the forces from the different posts were closing in upon the Tata Ndoda, and at 6 a.m., as it was getting light, it was reported by scouts of the 88th Regiment that the enemy were below in the Zanyookwe Valley and on the outskirts of the bush above. The rebels were already on the move, and appeared to be completely surprised. When the artillery opened fire, a large number of the enemy were seen to move rapidly in a south-westerly direction, towards where Colonel Wood's right column was advancing, and another portion descended into the valley, towards the position occupied by Lieutenant-Colonel Degacher's force. It was said that they intended to make an attack here, but the heavy fire under which the rebels came when crossing the valley changed their mind. This party took to the bush below, and, dispersing in small bodies, were met during the day as our lines closed in upon them, and lost severely.

Later on heavy firing was heard in Colonel Wood's direction, and from the hurried and uncertain movements of the Kafirs who had gone that way it was evident an engagement was taking place, for they could be seen running into and out of the bush which concealed Colonel Wood's advance from us, as a bystander described it, like rabbits.

The enemy here, it appears, were in great numbers, probably about 400, and behaved with great spirit. As the troops ascended the ridge they opened fire on the advanced guard, severely wounding Captain Stephens, of 90th Regiment, whilst at the head of his company, and killing Lieutenant Saltmarshe, who had taken his place when he fell. The path by which the column of Colonel Wood's force had to advance was surrounded by dense bush, which completely screened the Kafirs, preventing the artillery from at first using their guns. Afterwards they were enabled to unlimber and fire case shot into the bush at a distance of 30 yards. The company of the 90th Regiment left without officers was now taken over by Major Cherry, and succeeded in gaining the open ground beyond the bush and taking the enemy in flank. In a few minutes Commandant Von Linsengen's force appeared crowning the Tata Ndoda and the neck connecting it with the heights occupied by Colonel Wood's force. After this two companies of 2/24th and 50 dismounted men of the Frontier Light Horse, under the command of Major Buller, C.B.,

descended to an enclosure at the bottom of the valley, where the rebels had a large number of cattle, and then made their way to the high ground on the opposite side, and eventually entered the bush with the other troops. From this time till sunset the Zanyookwe Valley with the kloofs running from it were steadily worked through by the various forces.

A large number of women, about 400, belonging to Seyolo's, Pato's, and Edmund Sandilli's people, surrendered themselves at an early period of the day, which was fortunate, as in the thick bush it is difficult to detect the fact of their being women, and they might have been fired upon. In fact, on one occasion during the day they facilitated the escape of some men by forming up in front of them, and scarcely escaped being killed.

The Kafirs fought well at certain points, but the presence of so many Europeans disconcerted them. The day's work was successfully concluded by sunset, and the troops returned to their original posts.

The loss of the enemy on this day was 141 found as actually killed. Our loss (excepting Colonel Wood's right column) was slight; it consisted of one officer 90th Light Infantry killed and one wounded very severely, two privates 90th killed and five wounded (two of which have since died), two Fingoes killed and five wounded.

The rebels leave the district of the Tata Ndoda for the Buffalo Range.

Early on the 1st May parties of rebels passed across to the Buffalo Range, it was said by a Fingo woman who saw them, as many as 1,200. At 4 a.m. heavy firing was heard in the direction of Maclean's Fingoes near Bailie's Post, and a company of 2/24th was despatched to their assistance, when it was found that one of their parties had actually stumbled upon this camp in the dark. At daylight the bushes in the vicinity were searched, and 11 Kafirs were killed, two taken prisoners, and 100 women and children surrendered.

A party of rebels discovered in a cave.

On the 2nd May further search was made in the Zanyookwe Valley after rebels, and a party, supposed to number 50, amongst whom it was said was Seyolo and five other chiefs, were discovered in a strong position in a cave under a precipice or "krantz." The position was covered by dense bush and by large detached boulders of rock, from behind which the enemy fired on everyone approaching it; one of Siwani's Kafirs was killed in endeavouring to do so. A cordon of men was now made round the cave to prevent the rebels escape, and Von Linsengen with his force passed the night in the valley. Every endeavour was made to induce the party of rebels to surrender, but without effect.

On this day I accompanied the general in his visit to all the posts round the Tata Ndoda, and in the mission room at Burns Hill saw a corporal of the 90th who had received a gunshot wound of chest, the ball penetrating the right lung at its apex and dividing the axillary artery; he died the next day. The other wounded, after receiving every attention at the hands of Surgeon-Major Alcock, had been transferred to King William's Town.

At 8 a.m. on the 3rd May Von Linsengen made an attack upon the cave, and at noon the position was taken, 21 Kafirs were killed and two taken prisoners. On examining the ground an almost impracticable path underneath the precipice was found, by which it is supposed Seyolo and some of the rebels escaped during the night. Our loss on this and the previous day was six natives killed and four wounded.

The general moves into King William's Town.

The general and staff now moved into King William's Town whilst arrangements were made for the continuance of operations in the Buffalo Range and Perie Bush.

The enemy in the Gwili-Gwili Valley.

Before daybreak on the 3rd the enemy on the Buffalo Range descended in force into the Gwili-Gwili Valley, evidently with the object of obtaining supplies, as spies report that they were suffering from hunger. They were at once attacked by the Alica Fingo levy, and after a short engagement driven back up the hill into the Buffalo Poort Bush, 22 rebels being killed and four Fingoes wounded. One Fingo woman and one man resident in the valley were killed and three wounded. The Fingoes retook 90 head of cattle and 300 sheep which had been captured by the rebels.

The enemy return to the Buffalo Range plateau.

It was reported that there were a larger number of rebels about the Buffalo Range plateau than before. It would appear, therefore, that the fugitives from the Tata Ndoda had reinforced them there; this addition to their number did not, however, strengthen them, for they must have found a difficulty to obtain a sufficiency of food after the capture of all their cattle.

The dual system confusing.

This dual system of Imperial and colonial forces in the field was most confusing and embarrassing, although the latter were not under my supervision and I had nothing whatever to do with them when operating by themselves against the enemy, yet when the two forces were working in the same district, and they happened to come near and join the Imperial forces, I had to make provision for them. This, together with the fact of the column being continually split up and reformed in an entirely different manner, increased the number of posts and rendered it exceedingly difficult to provide medical officers for them. Besides which it was found impossible to get the strength of the several irregular corps for the weekly returns of sick, as the men were continually coming and going, and the numbers never remained the same. At last it was suggested to me to apply to the commissariat for the number of rations issued, and medical officers were directed to do so accordingly.

The troops arranged for operations in the Buffalo Range.

The bulk of the troops where now arranged for operations in the Buffalo Range, where the rebels had remained undisturbed since the 5th April; they were daily seen on the plateau, and numbered from 1,000 to 1,500. A path named Molyneux had been cut by the troops from Mount Kempt down to this plateau, and by using this it was hoped to prevent their retreating into the bush, all other paths by which they could retire being at the same time waylaid.

At daybreak on the 8th May the columns arrived as follows: Colonel Wood's from the head of the Rabala River to the Gozo Heights; Colonel Degacher's by Wood's path through the bush west of Haynes Mill to the plateau above, preceded by Allen Maclean's Fingoes; Von Linsengen's column found a path to the left of the latter column; Major Buller's force descended from Mount Kempt by Molyneux path to the lower plateau; Schermbrucker, advancing with his force from Isidingi by Mount Kempt, followed Major Buller: the forces amounting in all to four 7-pr. guns, 2,042 Europeans, 2,800 Natives.

The Kafirs in the plateau made no stand, although their position was a strong one for defence, but retreated to the bush below by the path just mentioned, from which, had it been waylaid, they would have been cut off; as it was they got possession of it. An attempt was made to storm it by some of the True Blues and Kaffrarian Rangers, but without success, and it was only when the Frontier Light Horse with Major Buller was brought up that it was taken. The loss, however, was severe, one captain killed and one severely wounded, a corporal and three troopers killed, five troopers wounded, one Fingo killed and one wounded.

The rebels having been driven from the Buffalo Range plateau on this day, the western portion of the Buffalo Poort Bush was searched the next day, but few Kafirs were found; the only casualty on our side was one officer 2/24th wounded.

Troops moved back into the Tata Ndoda district.

On the 10th May troops were again moved into the Tata Ndoda district, and orders given that the forces in two distinct divisions should harass the enemy occupying the two places, viz., Tata Ndoda and Perie Bushes.

Outworks erected on Gozo Heights and to the east of Tata Ndoda.

The outwork called Fort Evelyn was now thrown up on Gozo Heights for a garrison of two companies and two guns. This prevented the plateau from being occupied by the rebels. Another outwork was also made to the east of Tata Ndoda for one company and two guns, to prevent the occupation by the rebels of the Zanyookwe Valley and Kloof.

On the 11th May parties of rebels, unaware of what had been done, reassembled in this valley, but were dispersed by the guns and Maclean's Fingoes.

On the 12th the rebels were met again in their usual haunts, but Von Linsengen came across them in the bush east of Makabatele Ridge and attacked them, with a loss of 33 killed, 96 women and children being captured. Tini Macomo, it is said, was present in the fight.

On the same day Lonsdale's Fingoes, leaving the Gozo Heights at 3 a.m., descended the mountain to Haynes Mill, and beat the eastern valley of the Buffalo Poort, a company ascending to the stony precipice to the left called Sandilli's Krantz, came upon 500 Kafirs. In the fight which ensued 44 of the enemy were killed, and 18 women surrendered. The loss of Lonsdale's Fingoes was only one killed and five wounded. The prisoners state that the rebels are greatly disheartened and straitened for food.

Sandilli now sent in to ask what terms would be allowed hi hem if gave himself up. Sandilli asks for terms.

Orders were now given to the forces not to cease to harass the rebels day or night.

The losses known to have been inflicted on the rebels between the 7th and 12th were: killed, 138; prisoners, 3; approximate number of women and children surrendered, 118.

After the affair of the 12th May in the bush near Makabatele Ridge, it would appear that Tini Macomo tried to get back into his stronghold in the Waterkloof, and a fight between his tribe and the colonial forces took place shortly afterwards in the district of Fort Beaufort. He was subsequently taken prisoner by a party of Fingo police. Tini Macomo taken prisoner.

Early in May, in consequence of the crowded state of the hospital at King William's Town, where there were upwards of 150 patients, directions were given to the surgeons of the field hospitals in the Transkei and Komgata to send no more sick to the base until further orders. These hospitals were now looked upon as of a more permanent character; a certain number of beds in them were fully equipped, and other articles of hospital equipment were provided. At Ibeka, where, from its elevated and exposed position, the climate is cold, with frosts at night, it being then winter, it was recommended that a wooden building should be erected as a hospital, but this was not done, as it was found that the cost would be enormous, all the planks having to be carried from King William's Town, a distance of 95 miles, by bullock waggon, besides which the building could not be ready for occupation under six weeks or two months. This failing, a sod wall was built around the marquees as a protection against the piercingly cold winds which prevailed at that season. Surgeons of field hospitals to send no more sick to base hospital.

The rebels now dispersed over the country, having considered it hopeless to stand against British troops in the field; nothing of any importance, therefore, occurred for several days. Rebels disperse over the country.

Sandilli was reported to have left the Perie Bush and to have sought refuge in Anta's country, which lies contiguous to his own; but, from what afterwards occurred, he was no doubt all the time in his old quarters. Dukwana, one of his body guard, a Christian, an elder of his church, a man of property and of considerable importance, who considered it his duty never to leave the side of his chief, was killed on the 28th May by Lonsdale's Fingoes, together with 17 others, when they were attacking a body of 100 rebels. Those who knew the character of Dukwana, when they heard of his death, said you may be sure that Sandilli was not far off at the time.

As was to be expected, small bands of marauders now infested the country and carried off cattle from the farmers. Patrols were therefore sent out from the commandants of districts to clear the country of these pests.

During the next fortnight, owing to the energetic manner in which the various commanders, both Imperial and colonial, had carried on their duties, the rebels were completely driven from their fastnesses in the Buffalo Range, the most prominent rebel leaders were either killed or captured, and their followers dispersed.

Sandilli, as was conjectured, was present when the two companies of Lonsdale's Fingoes attacked the party of Kafirs on the 28th May, when Dukwana, one of his body guard, was killed. It has since become known that Sandilli in that action was mortally wounded. Sandilli mortally wounded in action.

From information received, a party of volunteers, accompanied by a guide, proceeded on the 7th June in search of his body. It was lying unburied, having evidently been hastily removed to a place of safety and hidden between two boulders, with the intention of removing it afterwards. It was identified beyond doubt.

Seyolo was also shot in the neighbourhood of the Fish River, and the deaths of other men of note were reported, viz., Kokwe, brother of "Oba," killed in the Schlemkloof, and Nquaka, brother of Macomo. Macomo himself and his brothers Jassi and Massolisi being prisoners. Seyolo and other chiefs of note either shot or taken prisoners.

T'Sindwane Gadu, Sandilli's chief councillor, and Lomta, the brother of Sandilli, were captured, together with other influential men.

The two sons of Sandilli, Edmund and Mantizima, rival aspirants to the chieftainship, were in hiding in the Thomas River district, but they sent in to the magistrate to say that they were anxious to surrender now their father was Edmund Sandilli and Mantizima anxious to surrender; after-

wards captured across the Kei.

dead. A short time after the issue of the amnesty in which their names were excluded they were captured when making their way to Pondoland.

The war virtually at an end.

The war was now virtually at an end, there being no man of note in arms against the Government but Makinnon and M'Dimta: and the only part of the Colony where rebels were reported to be still in some force being the Fish River district, where the colonial troops were operating.

Kreli hiding in Ndwessa Forest,

The reports from Galeakaland at this period state that Kreli was hiding in the Ndwessa Forest. Patrols were continually sent after him directly spies brought any news of his whereabouts. He is thus harassed day and night, and is said to be in a miserable, desponding state with only a few followers, and never remaining two nights at the same place for fear of being betrayed.

War at an end: an amnesty issued.

On the 28th June the war was proclaimed as at an end, and an amnesty was issued.

Preparations were now made to concentrate the troops (Imperial) at King William's Town, with the view of sending them off to Natal, where hostilities were expected in consequence of the disturbed state of Zululand.

Hospital at Ibeka to be removed to Butterworth.

Towards the close of the war, when it was contemplated to permanently occupy the Transkei by Imperial troops, the question arose whether the hospital should not be removed from Ibeka to Butterworth into some building. The latter place is about five miles nearer to King William's Town, is more sheltered, and is on the banks of a river of that name. The mission house was first applied for, but failing to secure this, the store formerly used as a hospital by the colonial forces during the first phase of the war, belonging to a merchant in King William's Town named Irwin, was solicited; he, however, would not allow it to be used for such a purpose, on which, according to colonial phraseology, it was "jumped," that is to say, it was simply taken possession of as Crown property, it being on conquered territory.

Surgeon-Major Cuffe, the senior medical officer in the Transkei, inspected it, and finding that it was well adapted for a hospital, it was fully equipped. It did not, however, long remain an Imperial hospital, for an order shortly afterwards came from the Home Government to give up Galeakaland to the Cape Colony. In consequence of their undertaking to garrison it the Imperial troops were removed and the hospital handed over to the colonial principal medical officer, together with such hospital equipment and medicines as they required, on payment.

Civil surgeons from England.

The civil surgeons, 17 in number, sent from England, arrived too late to take part in the war, the first batch of six reaching King William's Town on the 24th June, four days only before the amnesty was proclaimed.

Summary of the general state of health of the British troops during the period of active operations.

The British troops crossed the river Kei on the 8th December 1877, the summer was then far advanced and the weather was very hot—exceptionally so, in consequence of the absence of the usual rains and thunderstorms at this season. This was the second year of drought, and there was a great scarcity of water everywhere, both in the Ciskei and Transkei.

The troops soon began to suffer from diarrhœa, caused in all probability by the bad drinking water obtained at the different halting places, and from simple continued fever, due to exposure to a fierce burning sun and fatigue after long and harassing marches through such a trying country as Galeakaland. But the general health of the troops at the time was remarkably good.

About the middle of January 1878 heavy rains came on and continued for some time. These washed the decayed animals and vegetable matters, which had been lying for a lengthened period on the surface of the ground, into the rivers and streams, rendering the water at first source impure. And this, together with the damp and sudden changes of temperature, I am inclined to think, produced the dysentery which now began to appear. Several cases of enteric fever occurred also at this time at Quintana, due to local preventable causes.

At the beginning of March, although there was a good deal of dysentery in the Transkei, yet, strange to say, there was none amongst the troops operating at this time in the Waterkloof, notwithstanding the rains at one place were as heavy as at the other, and the changes of temperature as sudden. At the latter end of March, the rains having nearly ceased, bowel complaints began to diminish notably in the Transkei. But enteric fever, at first in an

insidious and mild form, occurred generally throughout the districts of Ciskei and Transkei, especially, however, at King William's Town, East London, Komgha, and Fort Beaufort, it being at the same time very prevalent amongst the civil population at these places.

During the following month the troops underwent great fatigues, privations, and hardships whilst engaged in active operations against the rebels in the Tata Ndoda and Perie Bushes, and were exposed to the excessive heat of the sun by day and chilling thunderstorms at night when bivouacked out, yet their health did not suffer to any great extent.

Now, as the winter approached, the nights became cold and the dews very heavy, and the alterations of temperature were very sudden and most trying.

As the month of May advanced, enteric fever began to assume a more serious type, several deaths were occurring, and no place was free from it. The troops quartered on the Buffalo Heights were attacked with it as well as those at the posts below, and it appeared to make no difference whether the drinking water was from a spring or river. In fact, no local cause could be discovered for its presence, and I was inclined to think that the disease was due to climatic causes, and was the true autumnal fever, which I hoped would be stamped out as the weather became more seasonable and the temperature more equable.

Description of the fever called variously enteric, malarious enteric, and typho-malarial.

Undoubtedly the most serious disease that occurred during the late war was this continued fever, designated variously as enteric, malarious enteric, and typho-malarial.

From reports received from three medical officers who were at different stations many miles apart, it appears in the first instance to have been imported into the ranks from outside sources.

Surgeon-Major Alcock shows that in the case of the column 90th Regiment and battery Royal Artillery, which, in passing through Fort Beaufort from the Waterkloof expedition to the attack on the Tata Ndoda and Perie Bushes, halted in that town, when enteric was there prevalent, by detachments for different periods of time. One company which had remained 20 days furnished five out of a total of seven cases of enteric fever, and that the field hospital and Royal Artillery, which were 11 days in the town, accounted for the other two; while the other four companies, some of which delayed more than three days, brought no infection with them.

Surgeon-Major Hickson points out that as regards the garrison at King William's Town the disease was clearly imported by two cases admitted on the 25th and 28th January respectively from Blanes Farm. This post was garrisoned by irregular troops, called Pulleine's Rangers, and had no medical officer, the nearest surgeon being a civilian at Kei Road Station, eight miles distant, who was supposed to visit it weekly or oftener if necessary. It was in a very insanitary condition at the time, being described as rooms overcrowded, horse lines too near the quarters of the men, no latrine trenches, a general dirty and offensive condition of the surface, and a defective water supply, the water used for all purposes being generally obtained from a stream close at hand, which, owing to the long and severe drought, had become extremely shallow. There was good water in a river about half a mile distant, but to reach it a deep hill had to be descended, and this the men would not take the trouble to do.

Surgeon Macartney attributes the origin of the fever at Komgha to the arrival of several sick men from Ibeka, whose disease subseqently proved to be enteric.

As to the peculiarities of this fever this latter officer enumerates "the "frequent presence of a dusky discolouration of the skin, the frequency of coma "and stupors, with suffused eyes and countenance, the presence of rashes other "than rose-coloured lenticular spots, the frequent absence of diarrhœa or of "pain on gurgling over the cæcum."

Surgeon-Major Hickson says, "most unquestionably in this epidemic the "absence of the usual rose-coloured lenticular spots on the abdomen, of "gurgling in the iliac fossa on pressure, and of diarrhœa, was in no period of "the disease sufficient, even when combined, to negative the diagnosis of "enteric fever. In a large number of cases of subsequent undoubted enteric, "men came to hospital only complaining of malaria, a little frontal headache, "lassitude and, gradual loss of appetite; the pulse would be found always

" accelerated (about 100) and weak, the sensible heat of skin often natural, " but the thermometer in the axilla generally indicated a temperature of 102 " or 103 degrees. The respiration was always quick and shallow, the face " was as often pale as flushed, and the tongue usually creamy, large, and " tremulous; it was only in seven cases far advanced that it became dry, brown " and fissured. In very many cases on examination at admission the symptoms " pointed to pneumonia; congestion of the lungs was present in almost every " case; in not a few the men only complained of sore throat, and on exami- " nation nothing could be observed except slight dryness."

And Surgeon-Major Alcock corroborates the foregoing in these words, "as " to the nature of the fever in these cases it presents certain peculiarities, " commencing as a febricula with white tongue, malaise, loss of appetite, nausea, " and heat of skin, and sometimes accompanied with marked dilatation of the " pupils; the first suspicious symptom is the occurrence of sore throat, in " which, though much complained of, and referred low down in the neck, there is " little to be seen beyond some congested follicles at the back of the pharynx; " tremor of the tongue and hand then attracts attention as being out of all " proportion to the apparent illness. What seemed to me most remarkable " was the want of correlation between the temperature and pulse, the latter " being but little accelerated (only to about 100), while the former had increased " with quickened respiration to 102 and 103 degrees. Diarrhœa was far from " being a necessary concomitant."

The remarkable absence of diarrhœa gurgling in the fossa and rose-coloured spots is commented on by all, and two out of the three observers notice the complaint of sore throat with no visible signs.

Surgeon Macartney adds "the manner in which diseases of malarious origin " led up to the recent outbreak of enteric fever adds considerable weight to " the belief, rapidly gaining ground, that this epidemic is something more than " enteric fever, that it is in fact a typho-malarial or true pythogenic fever with " malaria superadded."

In the majority of cases where a post-mortem examination was made, the peculiar patches of congestion in the stomach and the more continuous congestion of the duodenum noticed by Professor Maclean and others as pathognomonic of the typho-malarial fevers of the Mediterranean, were very well marked, in addition to the usual lesions of enteric.

Eighty per cent. of the cases admitted into King William's Town Hospital occurred in men under 25 years of age.

Diarrhœa and dysentery continued more or less until the close of the campaign; the latter was generally of a tractable character, soon yielding to treatment, and few deaths resulted from it,

Palpitation of the heart was common amongst the young soldiers, brought on by over-exertion and excessive fatigue.

Muscular rheumatism so prevalent in South Africa, did not affect soldiers in the field to any appreciable extent.

Admissions into hospital.

The millesimal ratio per annum of admissions to strength of the several corps which took part in the war is given in a tabular form, the regiments being placed according to date of arrival in the command.

Regiments.	Strength.	Admission.	Millesimal Ratio per Annum.
1/24th - -	684	211	30·8
88th - -	449	157	35·
Royal Artillery -	202	78	38·
90th - -	556	244	40·4
2/24th - -	677	328	40·8

The table shows that the longer a regiment had been in the command the less it suffered in health, and the fewer were its admissions into hospital. The last two regiments, viz., the 90th and 2/24th, both composed of very young soldiers, arrived a month after each other, and suffered in an equal degree.

The number of men invalided during the period of hostilities was 54. This, I am given to understand, is excessive in comparison with the invaliding of former Kafir wars, and shows that the season must have been unusually unhealthy. Invaliding.

The killed, died of wounds or disease, amongst the Imperial troops amounted to two officers and 45 men; amongst the colonial white troops, two officers and 27 men. Deaths.

J. A. WOOLFRYES,
Deputy Surgeon-General.

Pietermaritzburg,
20th November 1878.

APPENDIX No. IV.

KAFFIR WAR OF 1877-78.—REPORT ON WOUNDS AND INJURIES RECEIVED IN BATTLE ADMITTED INTO THE BASE HOSPITAL AT KING WILLIAM'S TOWN.

By Surgeon-Major R. M. Hickson, A.M.D.

The Kaffirs in this war, in addition to their assegais, made use of a variety of fire-arms, and were apparently well provided with ammunition. As a rule, however, they were ignorant of the method of sighting their rifles, some of which were of the best manufacture; they were also unsupplied with artillery. Consequently it was only when engaged at close quarters in the bush or in storming a krantz that severe losses were inflicted upon our men, and then the wounds, being mostly on the upper half of the body, were often instantly fatal. Two of the gunshot wounds included in this report were accidentally inflicted, another was of doubtful origin, but as they occurred on active service in the field it seemed unnecessary to distinguish them.

The following table shows the numbers killed in action and wounded, who were transferred to King William's Town, with the results, between the 27th September 1877 and the 28th June 1878:—

Corps.	Killed.		Wounded.		Died.		Recovered.		Total Deaths from Wounds in Action.
	Officers.	N.C. Officers and Men.	Officers.	N.C. Officers and Men.	Officers.	N.C. Officers and Men.	Officers.	N.C. Officers and Men.	
2/24th Regiment	—	—	2	—	—	—	2	—	—
88th Connaught Rangers	—	—	—	4	—	—	—	4	—
90th Light Infantry	1	—	1	3	—	1	1	2	2
Royal Naval Brigade	—	—	—	1	—	—	—	1	—
Colonial Corps	3	3	2	4	1	—	1	4	7
Fingoe Levies	1	—	—	19	—	1	—	18	2
Total	5	3	5	31	1	2	4	29	11

Deaths on the Field of Battle.

After certain engagements, some bodies of the slain were brought into the station for interment, and having been placed in the mortuary the position of the fatal wound was observed and recorded.

TABLE showing the INFORMATION collected under this HEAD.

Region of Body wounded, in Men killed outright on the Field of Battle.	Number of each.	Remarks.
1. Gunshot wounds of head	4	Mostly inflicted at a range of from 10 to 20 yards.
4. Gunshot wounds of chest	4	

Officers of Regular and Colonial Forces.

CLASSIFIED RETURN of WOUNDS and INJURIES received in ACTION during the KAFFIR WAR from 27th September 1877 to 28th June 1878, admitted into the Base Hospital.

Class.	Number.	Region of Body injured.	Number of Cases.	Died.	Discharged to Duty.	Invalided.	Remained 28 June 1878.
2. Gunshot wounds of face	1	Compound fracture of bones of face, perforating antrum.	1	—	—	1	—
4. Gunshot wounds of chest	1	Perforating the lung	1*	1	—	—	—
5. Gunshot wounds of abdomen.	1	Contusion of muscles (slight)	1*	—	1	—	—
6. Gunshot wounds of back and spine.	1	Wound of muscles of the back.	1	—	—	—	1†
9. Gunshot wounds of lower extremity.	1	Wound of muscles	1‡	—	1†	—	—

* Belonged to the Colonial Forces. † Subsequently invalided.
‡ Accidental, by Martini-Henry bullet.

Non-Commissioned Officers and Men of Regular Army, R.N. Brigade, and Colonial Forces.

CLASSIFIED RETURN of WOUNDS and INJURIES received in ACTION during the KAFFIR WAR from 27th September 1877 to 28th June 1878, admitted into the Base Hospital.

Class.	Number.	Region of Body injured.	Number.	Operation.		Died.	Discharged to Duty.	Transferred to other Hospitals.	Invalided.
				Amputation, Primary.	Excision, Primary.				
2. Gunshot wound of face	1	Compound fracture of lower jaw.	1	—	—	—	—	1	—
5. Gunshot wound of abdomen.	1	Penetrating with lesion of spleen and kidney.	1	—	—	1	—	—	—
6. Gunshot wound of back and spine.	1	Simple flesh wound	1	—	—	—	1	—	—
8. Gunshot wound of upper extremity.	4	Simple flesh wound	2	—	—	—	2	—	—
		Compound fracture of scapula (partial).	1*	—	—	—	—	—	1
		With fracture of humerus	1*	1	—	—	—	—	—
9. Gunshot wound of lower extremity.	3	Simple flesh wound	1	—	—	—	1	—	—
		With contusion and partial fracture of femur.	1*	—	—	—	—	—	1
		Penetrating astragalo scaphoid joint.	1†	—	—	—	—	1	—
11. Gunshot wound with direct penetration of the larger joints.	1	Elbow joint with fracture of humerus and radius.	1	—	1	—	—	—	—
15 Assegai wound	1	With injury of vessels	1*	—	—	1	—	—	—
Total	12		12	1	1	2	4	2	2

* Belonged to Colonial Forces. † Belonged to R.N. Brigade.

Non-Commissioned Officers and Men of Regular and Colonial Forces.

CLASSIFIED RETURN of OPERATIONS and of DEATHS following them during the KAFFIR WAR of 1877–78 in the Base Hospital.

Nature of Operation.	Operation performed.		Deaths following Operation.	
	Primary.	Secondary.	Primary.	Secondary.
Amputation, upper extremity arm	1*	—	—	—
Excision, upper extremity elbow joint	1†	—	—	—
Total	2	—	—	—

* Belonged to Colonial Forces. † Belonged to 90th Light Infantry.

The following table exhibits the chief points of interest in the cases :—

——	Admitted.	Died.	Recovered.	Percentage of Deaths to Cases.	——
Officers - - -	5	1	4	20·00	Regulars and Coloni
Non-commissioned Officers and Men.	12	2	10	16·66	Do. do.
Fingoes - - -	19	1	18	5·26	
Total - -	36	4	32	11·11	

Of the above five were punctured wounds inflicted by assegais, and two of the deaths resulted from them; the spinal cord being involved in one case (Fingoe), the femoral vessels in the other, the patient also suffering from dysentery. Four of the cases had more than one wound.

As regards treatment generally, little need be said. The wounded were, as a rule, in excellent health when admitted. Ample cubic space, free ventilation (extra blankets being allowed to counteract the sensation of cold), a liberal dietary from an early stage, with wine and malt liquor when not contra indicated, simplicity and lightness of dressings, and the avoidance of unnecessary interference were insisted on. No case of erysipelas, pyæmia, hospital gangrene, or tetanus occurred.

APPENDIX No. V.

REPORT OF THE DEFENCE OF "RORKES DRIFT."

By Surgeon-Major JAMES HENRY REYNOLDS, M.B., V.C.

On January the 22nd at about 12.30 p.m. we were surprised at Rorkes Drift by hearing big guns in our neighbourhood, and almost immediately I commenced climbing up the hill of Oscarberg in company with the Missionary Met and Mr. Smith, Army Chaplain. We expected to get a view of what was happening, but on looking across the Buffalo River from the top we discovered that Isandlana Mountain (five miles away) shut from our view the scene of action. The reports of three more big guns were distinctly audible after we completed the ascent, there being, I should say, a quarter of an hour's interval between each of them.

At 1.30 a large body of natives marched over the slope of Isandlana, in our direction, their purpose evidently being to examine ravines and ruined kraals for hiding fugitives.

These men we took for our own Native Contingent. Soon afterwards appeared four horsemen on the Natal side of the river galloping in the direction of our post, one of them was a regular soldier, and feeling they might possibly be messengers for additional medical assistance I hurried down to the hospital and got there as they rode up. They looked awfully scared and I was at once startled to find one of them riding Surgeon-Major Shepard's pony. They shouted frantically, "the camp at Isandlana has been taken by the enemy and "all our men in it massacred, that no power could stand against the enormous "number of the Zulus, and the only chance for us all was by immediate "flight." Lieutenant Bromhead, Acting Commissary Dalton, and myself forthwith consulted together, Lieutenant Chard not having as yet joined us from the pontoon, and we quickly decided that with barricades well placed around our present position a stand could best be made where we were.

In other words, removing the sick and wounded would have been embarrassing to our movement, and desertion of them was never thought of.

Just at this period Mr. Dalton's energies were invaluable. Without the smallest delay, which would have been so fatal for us, he called upon the men (all eager for doing) to carry the mealie sacks here and there for defences, and it was charming to find in a short time how comparatively protected we had made ourselves. Lieutenant Chard arrived as this work was in progress and gave many useful orders as regards the lines of defence. He approved also of the hospital being taken in, and between the hospital orderlies, convalescent patients (8 or 10) and myself, we loop-holed the building and made a continuation of the commissariat defences round it. The hospital, however, occupied a wretched position having a garden and shrubbery close by, which afterwards proved so favourable to the enemy; but comparing our prospects with that of the Isandlana affair we felt that the mealie barriers might afford us a moderately fair chance. The patients, I must mention, were retained in the hospital although situated at our weak end, as every part of the commissariat house was crowded with stores, and we did not consider either building would be taken unless with the fall of the whole place.

When our plans of temporary defence were nearly completed, I was relieved by seeing Mr. Met and Mr. Smith safely inside the laagar. They had just then returned from the hill where they remained up to a late moment continuing to believe the natives I before alluded to were our own men, instead of which they were the very Zulus who fought against us later on at Rorkes Drift. Mr. Smith was at this time looking for his horse and told me afterwards he should have to remain as his Kafir groom had bolted, and apparently taken with him the horse.

Mr. Met was making preparations to ride away.

About 3.30 p.m. the enemy made their first appearance in a large crowd on the hospital side of our post, coming on in skirmishing order at a slow slinging run. We opened fire on them from the hospital at 600 yards, and although the bullets ploughed through their midst and knocked over many there was no check or alteration made in their approach. They seemed quite regardless of the danger, and what struck me as most strange they had no war cry, nor did they at this time fire a single shot in return.

As they got nearer they became more scattered, but the large bulk of them rushed for the hospital and the garden in front of it. My attention being altogether directed for a while to these points I cannot state with authority whether the Zulus whom I shortly afterwards saw in a larger number on the opposite or north side of our fort got there by extending this body or if they came independently from the other direction, thereby carrying out their reputed mode of attack in a bull's horn fashion.

However it was, we found ourselves quickly surrounded by the enemy with their strong force holding the garden and shrubbery. From all sides, but especially the latter places, they poured on us a continuous fire, to which our men replied as quickly as they could reload their rifles; again and again the Zulus pressed forward, and retreated, until at last they forced themselves so daringly and in such numbers as to climb over the mealie sacks in front of the hospital, and drove the defenders from there behind an entrenchment of biscuit boxes, hastily formed with much judgment and forethought by Lieutenant Chard, R.E. I discovered afterwards that this officer when planning our defences reckoned on the assistance of the Basutos who deserted at the last moment.

It followed from this that our men at first had to be distributed over so large an area in proportion to our numbers as dangerously to weaken any one point and render it unequal to repel a determined rush, I am convinced but for this entrenchment our fort could not have held out five minutes longer.

A heavy fire from behind it was resumed with renewed confidence and with little confusion or delay, checking successfully the natives, and permitting a semi-flank fire from another part of the laagar to play on them destructively. At this time too the loopholes in the hospital were made great use of, so that the combined fire had the desired effect of keeping the Zulus at bay. It was, however, only temporary as after a short respite they came on again with redoubled vigour. Some of them gained the hospital verandah and there got hand to hand with our men defending the doors. Once they were driven back from here, to find shelter again in the garden, but others soon pressed forward in their stead, and having occupied the verandah in larger numbers than before pushed their way right into the hospital where confusion on our side naturally followed. Everyone tried to escape as best he could, and owing to the rooms not communicating with one another the difficulties were insurmountable. Private Hook, 2/24th Regiment, who was acting hospital cook, and Private Connolly, 2/24th Regiment, a patient in hospital, made their way into the open at the back of hospital, by breaking a hole in the wall with a pickaxe and then climbing over the sacks into the curtailed laagar. Most of the patients escaped through the small window looking into what may be styled the neutral ground, Those who madly tried to get off by leaving the front of the hospital were all killed with the exception of Gunner Howard. He gained with most extraordinary luck a detached rear without being noticed by the enemy, and after dusk, the Zulus still being close about him, he left this retreat to hide himself in the long grass 400 or 500 yards away. He did not rejoin us until daylight the following morning when it was no longer dangerous to move about.

Private Hunter, Natal Mounted Police, was the only one killed of those who made an escape through the small window. He was shot dead while crossing over to the biscuit boxes after his exit through the window, by a fire from the enemy from behind mealie sacks.

The only men actually killed in the hospital were three, excluding a Kafir under treatment for compound fracture of femur. Their names were Sergeant Maxfield, Private Jenkins, both unable to assist in their escape (being debilitated by fever), and Private Adams, who was well able to move about but could not be persuaded to leave his temporary refuge in a small room, and face the danger of an attempt at escape to the laagar. During this partial success of the enemy, very heavy firing was being made on our fort from all sides, and it was in this period we lost a large majority of our killed and

wounded. The engagement continued more or less until about 7 o'clock p.m. and then when we were beginning to consider our situation rather hopeless the fire from our opponents appreciably slackened giving us some time for reflection. Lieutenant Chard here again shined in resource. Anticipating the Zulus making one more united dash for the fort and possibly gaining an entrance, he converted an immense stack of mealies standing in the middle of our enclosure and originally cone fashioned, into a comparatively safe place for a last retreat. I would explain that the top of the cone was removed and a number of sacks was taken out from the heart of what remained, forming a sheltered space, sufficient to accommodate about 40 men, and in a position to make good shooting. Mr. Dunne, Commisariat officer, assisted in this work. Just as it was completed smoke from the hospital appeared and shortly burst into flames. The light given by it, however, proved advantageous to us (it being now nightfall), a matter which the Zulus themselves must have recognised, as no further attack was made from that quarter. During the whole night following desultory firing was carried on by the enemy, and several feigned attacks were made, with much shouting of their war cry, but nothing of a continued or determined effort was again attempted by them. About 6 o'clock a.m. we found, after careful reconnoitering, that all the Zulus, with exception of a couple of stragglers, had left our immediate vicinity, and soon afterwards a large body of men were seen at a distance in Zululand marching towards us. For a long time, and even after redcoats were distinguished through our field-glasses, we believed them to be the enemy, some of them perhaps dressed in the kits of those who had fallen at Isandlana. Indeed we could not think otherwise, as the Basuto officer who escaped with his men from Isandlana and retreated on our post the day before reported that the General's party had been broken up into small lots, each trying to get back into the Colony by any route.

Not until the mounted infantry, forming an advanced party, crossed the Buffalo drift, about a quarter of a mile off, were we convinced of our relief. Then we raised a white flag (for *they* were not certain of us either, seeing the hospital still smoking) and gave three cheers, really feeling that it was all right for us.

I do not think it possible that men could have behaved better than did the 2/24th and the Army Hospital Corps (three), who were particularly forward during the whole attack, as well as odds and ends of other regiments who happened to be present at Rorkes Drift on the occasion. It would be difficult to pick out the heroes from our garrison, but Corporal Schiess of the Natal Native Contingent (a Swede by birth) came under my notice as the most deserving of praise and recommendation.

APPENDIX No. VI.

REPORT ON THE CLIMATE AND DISEASES OF NATAL AND ZULULAND.

By Surgeon-Major N. Alcock.

Climate of Natal, and how influenced by its geographical position.

Natal, though situated but little more than 4° from the tropics, is endowed by natural causes with a climate peculiar to itself. Within the influence of the south-east trade, and lying from south-west to north-east, across the current of this wind, the surface of the land is so far heated by the summer sun as to cause a constant indraught from the ocean, thus adding to the strength of the breeze and carrying it farther inland than it otherwise could reach. Fed by the increased evaporation of the summer heat, this wind comes landward laden with large quantities of moisture, which, as it strikes the ascending plateau of the interior, falls in fog and rain during those months when the temperature is highest, rendering a region which would otherwise be permanently barren periodically productive. By these influences, too, the seasons are determined, so that although Natal receives but 30 inches of rain in all, or 5 inches more than England, nevertheless, as 25 inches fall within the six months from September to March, a rainy season of considerable violence is established.

Seasons in Natal.

The subjoined table shows the average amount of rain in each of these months, the number of days upon which it falls, the thunderstorms, and hot winds.

Months.	Average Rain in Inches.	Number of Wet Days.	Number of Thunderstorms.	Hot Winds.
October - -	3·2	17	6	4
November - -	4·9	17	7	3
December - -	4·8	18	8	2
January - -	3·2	16	7	1
February - -	4·4	14	8	1
March - - -	3·4	13	6	1

Not that these thunderstorms and wet days alternate regularly with fine, they, on the contrary, occur in uncertain series up to three or four, and are followed by as many dry; on two days out of three when rain falls it begins between the hours of 3 and 7 p.m.

Meteorological observations at Pietermaritzburg.

In Pietermaritzburg, as shown by a series of observations from 1858 to 1867, on 10 days only in the year does the thermometer exceed 90°, and on but 42 days does it exceed 84°. On seven nights only does the minimum temperature remain above 70°, and throughout the remainder of the year the night heat always falls below 60°. There need not therefore be any excessive exhaustion from the heat of Natal, since the nights afford sufficient opportunity for recovery.

Health of the troops in Pietermaritzburg.

As to the effects of the climate of Pietermaritzburg upon the health of the troops there stationed, the annexed tables, compiled from the records of three and a half years, from 1875 to June 1878, represent facts from which the most valuable information can be deduced. Taking as a basis the per-centage of sick to strength for each month in the year, it is shown that by far the greatest number of admissions to hospital took place in either February or March. It will be also seen that each great increase of sick coincides with the first marked decrease in the rainfall, and in further proof that the actual amount is not the true cause of disease, it will be noticed that the first three months of 1876, which were unusually wet, were remarkably healthy, while

the opening months of 1878, which were unusually dry, were intensely hot, and especially feverish. It is therefore obvious that the same rule which holds good in the more dangerous localities of India and elsewhere is not departed from with regard to the much milder malaria of Natal, viz., that the period of its greatest development coincides with the drying up of the rains.

Climate and disease of Stanger district.

With regard to the climate and diseases which prevail on the seacoast at the Tugela mouth, the following information has been obtained in reply to a series of questions sent to Dr. Jones, district surgeon at Stanger. The accounts usually given of the frequency and severity of fever along the coast of Natal appear to be somewhat exaggerated, since Dr. Jones considers that at a distance of 15 miles from the sea fever is not more prevalent than in the interior, that "high ground is comparatively safe everywhere in his district," and that the type of fever is mild, the attack lasting usually from 5 to 20 days. The season of its occurrence corresponds with that in Pietermaritzburg; it begins "about February," is at its worst in March, and continues more or less till the end of May, appearing to be influenced to some extent by the current of the north-east wind, which would of course carry the miasma of the St. Lucia swamps in this direction. Dysentery is not very common, but the occurrence of bloody urine is very frequent in both man and animals, and tapeworm exists to such an extent that Dr. Jones says "almost every second person you meet with has worms of some sort." The water in this locality is slightly brackish, but not apparently productive of any injury to health. On the whole, Dr. Jones regards the Lower Tugela division as being "remarkably healthy."

Climate and diseases of Umsinga.

With respect to the climate and diseases of the Upper Tugela between Umsinga and the river, Dr. Dalzell, district surgeon, looks on fever as comparatively rare, never having seen any serious cases except those brought out from North Zululand:—

"The high lands here are remarkably healthy. It is likely that white men "living in the deep valleys would take fever, but no white men live there." Dysentery and rheumatism appear to be more common in this locality, where also tapeworm exists "in abundance."

Cases of sunstroke have occurred, and Dr. Dalzell speaks of the heat in the valleys during the summer months as "terrible" between the hours of 11 and 3 p.m., also "the Tugela (18 or 20 miles only from this) runs in a deep valley. "Troops could not easily be kept healthy there owing to the intense heat, "while horses would almost inevitably die in great numbers unless stabled."

The water in the district is generally brackish.

Such then is the brief outline of the peculiarities of climate and prevalence of disease in Pietermaritzburg and the northern and north-eastern districts of Natal.

Precautionary measures.

The sanitary precautions against these conditions that suggest themselves as being most important are:—

That troops should never, unless compelled by some strategic necessity, be encamped in a valley, but should occupy as high ground as practicable, and that tents should be pitched for the men to sleep in whenever possible.

That hot coffee or cocoa should never be omitted when men turn out at or before daybreak, and that men on guard should always be provided with this ration, to be used as soon after 4 a.m. as it is possible to light a fire.

For the prevention of dysentery it is most desirable that the wearing of cholera belts by the men should be stringently enforced.

With a view to the avoidance of tapeworm, strict orders should be given that the internal organs of animals, such as liver, kidneys, brain, &c., are not to be eaten, and that all meat is to be thoroughly cooked.

The preparation of tea and coffee, to be carried in the men's water-bottles, should be encouraged as much as possible, so as to ensure the water being thus boiled before use.

In consequence of the water being brackish, and as it also, owing to its contamination with the droppings of animals, constitutes one of the means by which the tapeworm ovum finds its way into the stomach, it would be advisable that every means should be utilised for collecting the pure rain water as it falls, and using it for drinking purposes only. Very little ingenuity would be required to extemporise a rude funnel by which large quantities could be gathered and conducted to a receptacle for the use of each company.

The men should be warned against eating the wild fruits that may be met with.

Zululand.

Climate and health of Zululand at the sea-coast.

From what can be learned from those who have travelled through Zululand for the purpose of trading or of sport, it would appear that this country closely resembles Natal in its seasons, climate, and physical features, possessing the same healthful high lands and unwholesome valleys, with, however, this addition, that while within a belt of 15 miles from the sea, and extending from the Tugela mouth to the Umlatoosie River, the fever is but similar to the type of Natal fever in a like locality, nevertheless within the same belt, stretching from the Umlatoosie to St. Lucia Lake, the disease becomes as deadly and intractable as the worst malarious fevers of other countries. The same also holds good of the tract known as Uham's country, situated in the valley of the Black Umvelosie River, where a like propinquity to the lagoons of St. Lucia and also the proximity of the swamps of Delagoa Bay produce the same results.

Uham's country.

It is therefore evident that the fever of this country must always be intensified in every locality which is within reach of the poisonous malaria, borne hither and thither on the wind, and while its exact travelling power is still an unknown quantity, an index can be taken from the distance at which the Umlatoosie River lies, where, report says, it loses its greater virulence. No exact circle can, however, be drawn round the centre of infection, since the prevailing winds and the indraught of valleys must always carry it farther in some directions than in others.

Thus the valley lying at the foot of St. Paul's Mission Station, though only 10 miles long, is said to be especially unhealthy, and fatal to any oxen or horses that are benighted in its hollows.

The minor diseases of Zululand correspond with those of Natal and need only the same precautions.

A report just received from Rev. R. Robertson, of the Church of England Mission, confirms the foregoing in every particular. After an experience of 18 years' residence he says, "I look upon Zululand as a most healthy country; "many white men have died there it is true, but in many cases it was their "own fault, in my opinion."

Intestinal worms are "very prevalent indeed."

Pietermaritzburg,
28th September 1878.

APPENDIX No. VII.

CASE OF LIGATURE OF THE SUBCLAVIAN ARTERY FOR AXILLARY ANEURISM.

By Surgeon-Major OLIVER CODRINGTON, M.D.

T. P., 21st Hussars, aged 37, service 19 years, 14$\frac{11}{12}$ years' service in India, was admitted into Station Hospital, Hounslow, on 16th July 1877, complaining of pain in the left shoulder and side of chest, with numbness of the arm; the result, he thought, of a sprain in lifting an iron target some weeks previously.

State on admission.—A well made man, tolerably healthy looking, but showing signs of his service, states that he has had little sickness in his life. Medical history sheet shows a few entries for slight ailments and one for secondary syphilis in 1868, of 14 days duration, treated with mercurial vapour, &c. The superficial veins about the left shoulder much enlarged, a fulness under left clavicle, where, on palpation, a tumour is felt beating strongly and feeling like a fusiform aneurism about two inches long; the thrill distinct, and bruit on ascultation; pulsation in tumour quite controlled by pressure on subclavian over first rib.

For four to five weeks, treatment by rest, low diet, and iodide of potassium, was tried without effect, except that the tumour did not appear to increase.

During September and early in October digital pressure on the artery over the first rib was used every day for as long a time as the patient could bear it. At first there seemed to result from this some consolidation and less pulsation, but in the beginning of October it was evident that the tumour was increasing, and by 15th of the month it could be felt above the clavicle and in the axilla. The man's health was beginning to fail, and he was getting impatient, so it was determined to tie the subclavian in third part of its course.

Operation on 16th October, at 1.30 *p.m.*—Patient took chloroform very well; a mark having been made on the skin of the proposed incision, and others indicating the position where the artery passed over the rib; the incision, about three inches long, extending between two large superficial veins, was made through the skin in the usual way. The platysma and cervical fascia having then been divided on a director, the knife was laid aside, and by picking and tearing with the finger the vessel was exposed without any bleeding from the swollen veins in the neighbourhood, the directing marks on the skin, and afterwards the feel of the first rib, being the guides. The external jugular vein was kept well out of the way, and the internal, of very large size, which came into view early, was held aside with a blunt hook. The artery was found of natural size and seemingly healthy, and after considerable difficulty, from the aneurism needle not having a handle turning round in the fingers, a strong silk ligature was passed round it, and finally tied, after it was certain that nothing but the artery was included, and that pressure on the included vessel stopped the pulsation in the tumour. Venous hæmorrhage now welled up from the bottom of the wound, probably from a small vein near the subclavian, ruptured during the passing of the needle, but was controlled by deep pressure and exposure to the air. The wound was then brought together by wire sutures, pads, strapping, and a strip of carbolised lint, and the whole arm wrapped in cotton, wool, and flannel. 6 *p.m.* Quiet and well; no sickness, limb warm. 10 *p.m.* Re-action set in; patient comfortable, temperature 100·4. A little beef tea and 20 minims of Battley's solution given.

October 17.—No sleep last night, but patient easy, except feeling of throbbing in shoulder, skin perspiring, temperature normal, no pulsation in tumour, arm warm, wound dry and free from smell; slept a little in afternoon, takes no food but a little beef tea; enjoys a smoke.

October 18.—Feels well, inner half of wound united, no discharge, temperature of body normal, of left arm 97·4.

October 19.—Slept well, temperature of body 99·2, of left arm 97·8. First dressing of wound, inner half and outer quarter healed, slight healthy discharge along ligature.

October 20.—Aching about shoulders relieved by hot flannel and aperient. Chop and pudding ordered.

October 22.—Sutures removed; consolidation about seat of ligature; aneurismal tumour can hardly be felt; benzoated lard dressing.

October 25.—Doubtful pulsation in radial at every other heart beat.

October 26.—Ditto at each heart beat.

October 27.—(11th day after ligature.) Radial pulse quite evident. Patient feels well. Free discharge from wound. No pain.

October 29.—Arm getting useful.

November 1.—Some thickening and soreness along external jugular, and giddiness complained of.

November 2.—(17th day.) Ligature came away easily.

November 9.—Swelling of tissues about neck and clavicle not inflamed or painful. Wound not closing.

November 12.—Enlargement of cervical glands. Wound still open, but discharging little.

November 22.—Swelling subsided; a sinus runs some little way towards shoulder.

November 23 *and* 24.—Much swelling of base of neck and seat of aneurism, with throbbing; discharge stopped; fever; temperature 102·3, pulse 99.

November 25.—Less fever, pain and swelling in axilla, where thickened vessel can be felt; temperature 100·4.

November 26.—Slight pleurisy in mammary region. Wound looking healthier.

November 28.—Pleuritic pain still. Swelling of neck less; discharge increased. Throbbing in axilla and along brachial vessels, which are hard and painful. Temperature 101.

November 30.—Little swelling now. Sinus not healing, pain localised in axilla. Temperature 102 at night, normal in morning. Wasting of pectoral muscle now shows size of aneurism to be about 4 inches by 3 inches.

December 7.—A good deal of pain and constitutional disturbance, indicating suppuration about the sac have been present for some days past, to-day relieved by copious discharge of pus from the sinus.

December 10.—General health much improved, discharge slight, wound looking healthy. Still tenderness and hardness along brachial vessels. Sac of aneurism much diminished.

December 31.—Has improved well lately. Wound healed, able to walk about a good deal, and use the arm freely.

January 23rd, 1878.—Discharged the service. I have no report of the condition of the sac after I ceased to have charge of him in the middle of December, but I have heard of him once since his discharge as quite strong and well, and able to lift a half hundred-weight easily with the left arm.

APPENDIX No. VIII.

NOTE ON THE POST-MORTEM EXAMINATION OF THE HEART.

By Surgeon JOHN MARTIN, A.M.D.

IN ordinary autopsies the points to be recorded with reference to the heart may be grouped as follows :—

1st. Quantity and quality of blood contained in each cavity.

2nd. Continence of the (*a*) aortic, (*b*) pulmonary, (*c*) left auriculo-ventricular, and (*d*) right auriculo-ventricular valves.

3rd. Size of the orifices of the same.

4th. Condition of the internal structures, of the substance of the walls, and of the great vessels.

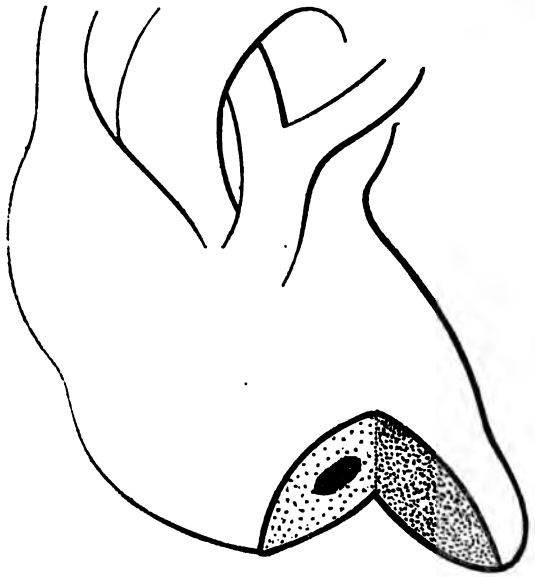
In conducting examinations it is desirable to adopt a method of procedure which will yield the fullest information on all these points. Hitherto the chief difficulty has arisen with reference to the determination of the continence (or sufficiency, as it is sometimes less accurately termed) of the auriculo-ventricular valves. Prof. Virchow observes : " In an ordinary post-mortem examination " no method can be adopted whereby the capacity for closing of the auriculo-" ventricular valves can be thoroughly tested. We must content ourselves " with supplying this deficiency by a minute examination of the valvular " parts." (*Post-mortem Examinations*, p. 35.) The purpose of this note is to indicate a method of testing the closure of these valves, which in the case of the left (the mitral) is usually considered a matter of importance.

As the entire examination has to be modified with reference to this point, all the steps in the examination of this viscus are here given.

1*st. Quantity and Quality of Blood contained in each Cavity.*—This point is to be determined while the viscus is *in sitû*, as laid down in the rules published for the performance of forensic autopsies in Germany.* The reason is obvious : " the lungs ought not to be removed from the thorax before the " heart has been examined, for this cannot be done without separating the " pulmonary artery and veins. Unless ligatures are previously applied to " these vessels—and it is neither customary nor needful so to do—their " division will be immediately followed by the escape of a certain amount of " the contents of the left auricle, of the trunk of the pulmonary artery, and " of the right ventricle. And just the same thing happens as when we remove " the liver and open the inferior vena cava before opening the thorax, viz., a " diminution of the quantity of the blood contained in, or else a complete " emptying of important parts of the heart." (Virchow, loc. cit.) To ensure a correct estimate of the contents of the ventricles, the auricles must be first opened in the usual way, and the quantity and quality of the contained blood recorded. Then the ventricles are opened, but *not* in the usual way. The

* Regulativ für das Verfahren der Gerichtsarzte bei den gerichtlichen Untersuchungen menschlicher Leichname. Herausgegeben von der Konigl. wissenschaftlichen Deputation für das Medicinalwesan 8, 1875.

right is opened by cutting off its apex, that is, the right half of the apex of the heart by two incisions, thus :—



making an opening into it of sufficient size only to admit of the detection and removal of coagula by introducing the point of the little finger. The quantity and quality of its contents are recorded, and the left ventricle opened in like manner.

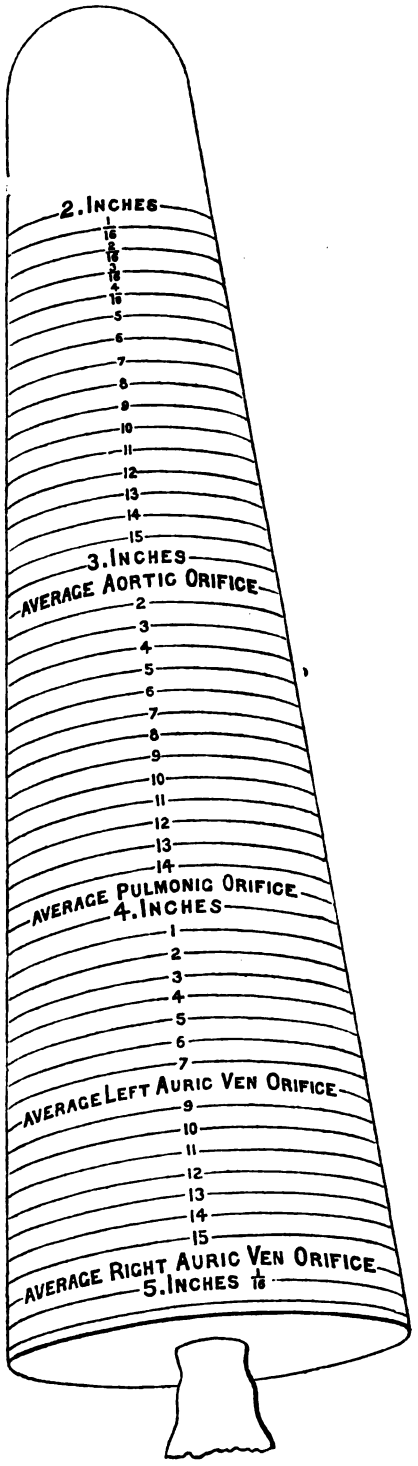
2nd. Continence of the Valves.—The palm of the left hand is now placed under the heart, the viscus encircled by the fingers, and removed by dividing the venæ cavæ, the pulmonary veins, the pulmonary artery, and the aorta. The chambers of the heart being quite emptied, the continence of the aortic and pulmonary valves is now tested.

This is done by lightly grasping the heart about its centre, and plunging the lower part, where the apex has been cut off, into a glass vessel filled with clear water, the aorta being on the side away from the hand. The vertical position of the heart is now so adjusted that the plane of the aortic orifice is parallel to the surface of the water. A little white fluid—water with calcined magnesia in suspension, or (as the writer generally uses) milk—is poured into the aorta, the walls of which are not to be held. If the valves do not close accurately the white fluid is seen issuing from the aperture at the apex of the left ventricle, and the water in which the apex is submerged becomes clouded.

The pulmonary valve is next tested by turning the heart so that the pulmonary artery is away from the hand; adjusting the plane of its orifice to that of the surface of the water; and proceeding as before, using fresh water.

To determine the continence of the auriculo-ventricular valves, the position of the viscus is reversed; the auricles being plunged into clear water, and the white fluid poured through the aperture in the apex of the ventricles. The left, as the more important, may be tested first. The aorta must be folded up on the side of the heart, and pressed against it by the finger to ensure that none of the white fluid passes out of the left ventricle through it. If the valves be incontinent, the white fluid will flow through the incision already made in the auricular wall, and the water be clouded.

The right valve is then tested in the same manner, the pulmonary artery being folded up on the heart to ensure that none of the white fluid flows from the right ventricle through it. The objection to these tests is that the weight of the fluid poured in cannot be so great as the force of the *vis a tergo* of the blood current, or of the systole to which the valves are subject during life.


2. INCHES
1/16
2/16
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3. INCHES
AVERAGE AORTIC ORIFICE
2
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14
AVERAGE PULMONIC ORIFICE
4. INCHES
1
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7
AVERAGE LEFT AURIC VEN ORIFICE
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14
15
AVERAGE RIGHT AURIC VEN ORIFICE
5. INCHES 1/16

But this does not lessen their value as affirmative evidence, because, if any fluid does pass them, we may *a fortiori* be certain that some regurgitation took place when these valves were subjected to the greater force of the blood current during life.

At all events, these tests, combined with minute examination of the valvular structures, are the only means available for determining the point.

3rd. Size of the Orifices.—The cavities of the ventricles are now opened by the ordinary incisions, taking care to preserve their base intact. The size of the orifices may be determined by passing through them ivory balls of various sizes, as those used in the mortuary of the Royal Victoria Hospital at Netley, or by introducing a graduated measuring plug.

The latter is most convenient, because, unless there is a great variety of balls, an orifice may admit one easily, and be too small for the next larger size.

The plug which the writer is in the habit of using may be here briefly described (*see* p. 271).

It is a graduated cone of wood (one of porcelain would be preferable), 7 inches in length, the apex rounded off, and a handle inserted into the base. The circumference at the first ring nearest the apex is 2 inches, that of the ring nearest the base 5·5 inches. It is graduated so that each eighth of an inch of its length is equivalent to a sixteenth of an inch variation in its circumference. The measuring plug should always be inserted into an orifice in the same direction as that taken by the blood current during life. It is more easily carried about than balls, and can be fitted into a post-mortem instrument case.

4th. The conditions of the internal structures of the cavities, of the substance of their walls and septum, and of the great vessels, are now to be determined by lens or microscope.

These details are described here necessarily at some length; but it must not be thought that this method of examination is tedious or takes up much time. The whole inspection need not occupy more than 10 minutes, and if the sequence of the steps as here given is adhered to, and the reasons for it remembered, anyone who adopts this method will admit that it is simple and ready, and that its results are more satisfactory than those arrived at by an unsystematic examination of the heart.

[It may be observed that if the hydraulic test of continence of the valves here described is trustworthy, and there seems to be no reason to doubt its accuracy if carefully performed, a small amount of mitral stenosis is by no means an infrequent condition of apparent cardiac integrity. In fact, this condition of the mitral valve would seem to be the rule, and absolute closure the exception. It would seem that a slight regurgitation through this valve is compatible with health, and that it is only when excessive it constitutes appreciable disease; but the other valves are found to close completely, as the rule. This is not surprising when one considers the difference between the form, structure, and attachments of the mitral valve, and of those situated at the other orifices.]

APPENDIX No. IX.

ABSTRACTS OF THREE CASES.

By Surgeon-Major H. KELSALL.

Case No. 1.—Bayonet Wound of the Abdomen, with Wound of unprotruded Viscera.

ON the night of the 31st July 1878, at Penally Barracks, near Tenby, during an altercation with a comrade, Private Thomas Thomason, 36th Regiment, received a bayonet stab in the left groin, penetrating for some inches into the cavity of the abdomen, followed by considerable hæmorrhage, which was arrested by the orderly of the Army Hospital Corps.

There was also a severe scalp wound over the left parietal bone, inflicted by the same weapon.

When seen shortly afterwards by Dr. Reid, a private medical practitioner, the patient was much exhausted, and, being unable to micturate, a catheter was employed, and about two ounces of urine drawn off; he also wished to use the stool, and after some effort discharged about half a pint of blood from the bowels. A full opiate was administered, and he was left for the night.

August 1. Great pain and tenderness in the abdomen and groin, but no urgent symptoms of peritonitis; pulse 110, tongue furred; he was frequently visited during the day, and was kept under the influence of opium; had passed urine two or three times.

August 2. Less pain; abdomen somewhat swollen; pulse 108. Slept during the night. Bowels have not acted; slight vomiting. Bandage removed, and wound found to be nearly healed.

August 3. Rather more swelling, also tenderness, in epigastric region. Bowels have not acted; urine plentiful; pulse 96, tongue furred. Omit opium.

August 4. Abdomen still tender; no sickness; pulse 96, strong. Bowels not moved; ordered castor oil.

August 5. Bowels have acted twice; the first motion very dark and mixed with blood, the second a more natural colour. Less tenderness; pulse 96.

August 6. Bowels have acted naturally. Tongue clean and moist. Sat up for two hours during the day.

From this time until his removal to the Station Hospital, Pembroke Dock, he continued to convalesce, but on the morning of the 11th (having arrived on the 10th) he suffered a relapse of pain and tenderness, and for several days the temperature was considerably above the normal standard; but by perfect rest in bed he recovered, and was discharged to duty on the 8th September.

Remarks.—At the time of the injury the bladder and bowels were nearly empty, water having been passed a few minutes before, and the bowels had been evacuated in the morning, and very little solid food taken during the day, as he states. There can be no doubt that the intestines were perforated in one or more places, as shown by the blood passed per anum, and the amount of peritonitis was limited to the necessities of natural repair.

Case No. 2.—Multiple Abscess of the Liver.

Lieut. G. D., 36th Regiment, aged 25, served for five years in India, and returned home 18 months ago. Habits have not been temperate. He has long been in delicate health, and suffered in India from ague and hepatitis. (June 3rd, 1878) applied for treatment a few days ago.

Present state.—He is intensely anæmic, with pearly conjunctiva, and much reduced in flesh; weight a little over 8 stone; height 5 feet 6 inches. States that when on leave at Devonport in April last he had a severe rigour, lasting some hours, and suffered since then with pain in the right side. He did not place himself under medical treatment then. On examination, a swelling or

bulging is observed below the right nipple, between the sixth and seventh ribs. This had been preceded a few days ago by severe pain in that part. Abdomen swollen and tense, muscles rigid, dulness on percussion, extending above nipple, breath sounds absent from nipple downwards; respiratory murmur harsh at apex of lung; tendency to hectic at night; temperature varies from 99 in morning to 101 at night. Has had several severe night sweats; tongue clean, appetite fair, pulse rapid and hard; average 100. Ordered fomentation and poultice to side.

June 10. Has hitherto kept up on the sofa during the day. The abscess, about which there can be no doubt, is rapidly advancing towards the surface. There are also two other suspicious red spots, one an inch below the bulging, the other well below the edge of the cartilage in hypochondriac region.

June 16. In consultation with Surgeon Gallwey and Dr. Morison, of Pembroke, it was decided to endeavour to aspirate the abscess at the upper spot between the six and seventh ribs, which was shiny, tense, and fluctuating. A large needle was used, and about eight ounces of sanious pus removed, with great relief to the patient, who bore the operation well. No air entered, and the spot was sealed with lint and collodion as the needle was withdrawn.

Slept well during the afternoon; temperature 99 next morning; skin cool, and no night sweats.

June 20. The spot adjacent to the puncture is threatening to point. He was, during the day, carefully moved in a Bath chair to a separate ward in the hospital from small lodgings, to facilitate proper attendance and treatment.

June 21. Slept well and expressed great relief and comfort from the change to the airy ward, and is quite hopeful. The point of puncture, however, has sloughed and broken down, a thick creamy pus being discharged. Tongue moist and clean; temperature 101·2; pulse 108.

June 22. A trained nurse arrived from London and took charge of the nursing, hitherto performed by the hospital staff.

June 23. From this date the case assumed an unfavourable turn, a vast quantity of lumpy, creamy pus coming away, soaking the dressings, the character gradually changing to thin sanious fluid; and during the night the original spot and one adjacent coalesced, revealing a large sloughy opening in the side, through which purulent fluid welled up at each inspiration. Diarrhœa now set in, turning to dysentery, with cadaveric odour. Pulse 140, tongue dry and brown. He became delirious, refusing all nourishment, and, rapidly sinking, expired at 8.15 p.m. on 24th June.

A partial inspection only of the body was possible. Body emaciated, a large sloughy aperture gaping between the sixth and seventh ribs, which were eroded. The two lower spots had also commenced to slough. A large abscess of the lung was seen occupying the greater portion of the lower lobe, and was traced by a funnel-shaped opening through the diaphragm, connecting it with the principal abscess of the liver. The entire organ was then removed and found to be riddled with abscesses of various sizes; there were six larger ones, some filled with thick creamy pus, others with thin sanious matter. One of the former kind was pointing at the posterior convex aspect, and would shortly have burst into the peritoneum. In most of them a distinct pyogenic membrane was traced. Around the lung abscess was a firm wall of hepatised tissue, with scattered masses of cheesy deposit, suspiciously like tubercle, although the rest of the lungs showed no trace of it. There were signs of recent pleurisy, extending to the apex of the right lung, of which the upper lobes were partially consolidated. Gall bladder contained some bile. Nothing unusual in the portal veins. Large intestine bore traces of ulceration about the rectum and sigmoid flexure; there was no history of dysentery, as far as could be ascertained.

Remarks.—At the first glance it seemed a question whether an empyema might not exist, the physical signs not precluding such a supposition, but all doubt as to the diagnosis was soon set at rest by the rapid advance of the abscess, and its tendency to point again lower down; no decided opinion could be formed at that time as to its being multiple or not, and considering the youth of the patient, it was hoped that if the abscess were single, from the writer's experience in similar cases, that the use of the aspirator might afford the best chance. It is evident, however, that the rôle of this valuable instrument has its limits, and the largest needle would have failed to evacuate pus

of this description. In reviewing the circumstances, however, and considering the hopeless nature of the case as revealed by the inspection, the use of the aspirator can hardly be deemed to have been meddlesome, nor in fact to have had any influence on the issue of the case.

Case No. 3.—(*a.*) *Fatty Lines.* (*b.*) *Obstruction of Vena Portæ.*

July 20, 1878. Sergeant J. Moon, a pensioner and a survivor from the Balaclava charge, late 17th Lancers, employed as barrack sergeant, had been ailing a long time, but only applied for treatment a short time before admission, complaining of severe pain in right side, coming on suddenly and without apparent cause. This was relieved by treatment, and on admission he was in a condition of extreme debility, with some pulmonary congestion, œdema of the lower extremities, with albuminous urine; the veins of the leg and superficial veins of abdomen varicosed to a serious extent, extreme pallor and waxy complexion. Habits formerly intemperate, but lately abstemious. Ordered packet poultice and diffusible stimulants. Temperature 99·2, pulse 90, skin cool.

From this time until his death on the 23rd there were no overt symptoms beyond those of increasing pulmonary obstruction, but during the night he became uneasy with orthopnœa and pain in the right side, retaining consciousness nearly to the end. He expired at 5 a.m. on 23rd July.

Post-mortem 29 hours after death.

Body thin and ill-nourished. Œdema of ankles. Large cicatrix on left leg of varicose ulcers. Veins of legs and thighs and superficial abdominal veins enormously varicosed.

Thorax.—Lungs deeply congested at bases. Heart enlarged, loaded with fat. Muscular structure pale and soft, undergoing fatty degeneration. Right side loaded with black clots and dark venous blood, an organised clot extending some way up the pulmonary artery.

Abdomen.—Liver enlarged, the cortex entire, adherent to the diaphragm in convex aspect in a circular patch 2½ inches in diameter, and on separating it a large vascular mass was found occupying three-fourths of the right lobe, and was seen through the cortical structure as a soft, dark, fluctuating substance. On cutting into it an enormous clot was turned out and observed to be contained in a well-defined cyst surrounded by a red zone of hyperæmic tissue giving the appearance of organised fibrin. The portal system and iliac veins were distended with black fluid blood which welled up and partly filled the pelvis. The remnant of the right as well as the left lobe of liver pale, soft, and in a state of fatty degeneration. Gall bladder contracted, containing a little turbid puriform fluid. A careful inspection failed to show any connexion between this embolic infarct and the aorta or abdominal arteries, and the inference, therefore, is that this, I might almost say unique,* pathological appearance is due to embolism of the portal vein.

There was no history or appearance of external injury, but 12 days before death and previous to admission he had complained of acute pain in the right side lasting for some hours.

Kidneys loaded with fat. Capsules slightly adherent, surface studded with small cysts the size of millet seeds, containing gelatinous fluid. The organs much contracted. Medullary substance encroached on by fat and much diminished.

Liver and kidneys sent to Royal Victoria Hospital Museum, Netley.

Remarks.—The unusual lesion thus imperfectly attempted to be described coincides with the account of similar morbid appearances in other organs as described by Dr. Green in his work on Pathology, where, in tracing the course of a hæmorrhagic infarct, he says that "the softened tissues are usually "surrounded by a zone of intense hyperæmia, the result of the stress thrown "upon the collateral vessels. This zone of hyperæmia is very characteristic, "and indicates at once the nature of the lesion," the only difference in the present case being that the clot, in bulk about a quart, and homogeneous, like firm black currant jelly, seemed to have superseded or replaced the liver tissue, which had entirely disappeared.

* I write under correction.

APPENDIX No. X.

CASE OF INJURY OF THE KNEE JOINT, EXCISION OF A PART OF THE ARTICULATING SURFACE OF THE FEMORAL CONDYLE.

By Surgeon-Major F. P. STAPLES.

No. 1,506, Gunner D. M., Royal Artillery, came under my care in the Herbert Hospital, Woolwich, in July 1878, for synovitis of the right knee joint. The history of the case showed that on the 14th of the previous month, while engaged at a field day, he had fallen from an ammunition wagon, and that the wheel of the latter had passed longitudinally over his right knee, right shoulder, and then struck him heavily on the right side of the head. The described injuries were a contused wound on the right knee situated between the patella and inner femoral condyle, a simple fracture of the clavicle, and a lacerated wound of the lobe of the ear.

On admission into hospital the patient was described as suffering severely from the shock of the injury and from bleeding from the auditory meatus, the latter giving rise to suspicions of a grave nature. The progress of the case, however, as regards the cerebral symptoms, enabled the medical officer in charge to give a favourable opinion on the second day after admission, the note in the case book being as follows:—

June 15th, 1879. "Going on favourably. I do not think the base of the "skull is injured, the blood comes probably from the meatus or from a "ruptured tympanum." The note further records a very severe synovitis of the knee joint.

The case progressed very favourably as regards the shock, injury of the ear, and fractured clavicle, but not so, however, as regards the knee joint, which became the seat of a severe and persistent synovitis. On the 24th of July, that is to say, six weeks after the accident, the joint was quite distended with fluid, and any attempt to place the foot upon the ground was accompanied by severe pain. Ordered to have Scott's strapping applied and the limb to be bandaged.

July 31st. Dressing removed. The joint has undergone a good deal of improvement as regards the amount of effusion since the date of last remarks.

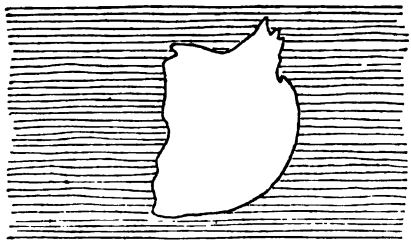
August 5th. There is further marked decrease in the amount of fluid effused. For the last few days, that is, since the decrease of the effusion, it has been possible to detect a moveable body underneath the site of the original injury, namely, between the inner edge of the patella and inner condyle. It is about the size of an almond, and apparently a loose cartilage. It passes into the joint when the leg is flexed upon the thigh, but when the limb is extended it can be fixed beneath the joint capsule.

August 30th. The synovial inflammation having subsided, and the patient's consent obtained, I removed the foreign body from the joint by a valvular incision and under antiseptic precautions. During the operation, owing to its attachment, it was necessary to dissect it from off one of the bones of the articulation. Two small vessels required ligature. The skin wound was brought together with wire sutures, dressed with four layers of lint soaked in benzoin tincture, and the limb placed upon a MacIntyre splint.

It will be convenient here to notice the foreign body. It was impossible during the operation to see its exact attachment owing to the depth and smallness of the wound, but an examination of it, in which I was assisted by my colleagues and by Professor Longmore, C.B., and Dr. Aitken, F.R.S., of Netley, showed it to be a portion of the articulating end of the femur, and corresponding to that part upon which, in the ordinary movements of the joint, the inner articular surface of the patella glides. It was nearly square shaped, and measured about three-quarters of an inch either way. It pre-

sented two surfaces, one covered by articular cartilage, and the other exhibiting fractured cancellated bone. Its thickness varied from a few lines at its outer to a quarter of an inch at its inner edge. The following rough sketches give a fair representation of its size: No. 1 giving a view of its superficies covered by cartilage and its attachment, which had to be divided. No. 2, giving a view of

No. 1.



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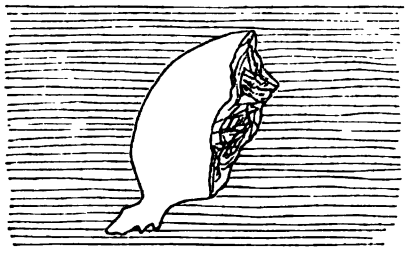


its inner edge, showing the line of fracture. The foregoing notes have been condensed from those in the case book for the sake of brevity. For the same reason those describing the subsequent progress of the case—which was one of uninterrupted recovery—are given almost verbatim.

August 31*st*. Patient slept well during the night. There is little, if any, swelling of the joint, which he says is not painful.

September 5*th*. Changed the dressing for the first time, and found on the under surface a streak of inspissated discharge, corresponding to the wound. The ligatures came away attached to the dressing. Silver stitches removed. Redressed under spray with tincture of benzoin.

September 7*th*. Dressing removed under the spray, when another line of inspissated discharge was noticed on the dressing corresponding to the wound, but of less amount than that observed on the 5th. The wound is looking quite healthy. It is not considered necessary to continue the former dressing. To have carbolic oil on lint applied.

September 8*th*. Wound looking quite healthy and covered with granulations. There is some tenderness on pressure between the external wound and the line of incision of the joint capsule, but it is very slight. Patient says there is also some pain about the tibial attachment of the ligamentum patella, and in this situation there is some slight œdema. To continue the carbolic dressing to outer wound.

September 17*th*. External wound healed and scabbed over. There is still some tenderness over the place of incision into the joint capsule, and also around the lower margin of the patella. Leg to be taken off the splint.

September 21*st*. The leg to rest on a pillow, and to be moved slightly (occasionally).

September 25*th*. Walks about with a stick.

October 1*st*. Is still a little frightened to use his leg, there is nothing to prevent his doing so.

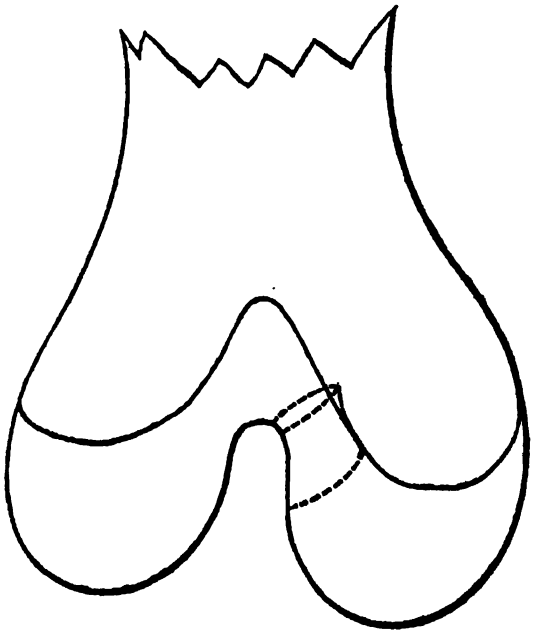
October 13*th*. Walks about freely now.

October 14*th*. Discharged to duty.

Added note October 30th, 1879. I was fortunate during a visit to Woolwich to-day (14 months since the date of the operation) to have an opportunity of

examining Gunner M., I found that there was no difference in the size of his knee joints, and that the action of the right were perfect. He stated that since his discharge from hospital he had performed his duties as a limber gunner. Further, he said that when he had to jump off the limber his right knee felt a little weaker than the other, and occasionally also it felt a little stiff. He seemed I thought anxious to make much of these symptoms for his own reasons possibly, for there appeared to be nothing to account for them. The bony outline of the joint was equally as well marked as that of the other limb.

Remarks.—The above case appears to be worthy of record as a contribution to the surgery of the knee joint; firstly, on account of the unusual nature of the injury; secondly, as an illustration of a difficulty in the diagnosis of loose cartilages; thirdly, as regards the reparative power of the articular ends of long bones. The first does not apparently need any comment further than to call attention to the rarity of intracapsular fracture of the lower extremity of the femur. The error of diagnosis, namely, the fragment being mistaken for a loose cartilage would appear even now to have been inevitable. Like those structures it followed, apparently, a severe synovial inflammation, and as far as movement was concerned its habits were not different. It is true that it was not moveable from above downwards, or in a contrary direction, but this, it was considered, depended upon its large size, or possibly upon some peculiarity of shape, and the same would equally apply to a loose cartilage. The most important point, however, raised by the case is that which bears upon the reparative process in the articulating extremities of long bones. Clinically speaking, or in other words bearing in mind that since the removal of the fragment, or for a space of 14 months that the patient has performed the very arduous duties of a gunner in field artillery, it would appear to be very perfect, but still if the place from which the fragment has been detached is remembered, and which is indicated by the dotted lines on the following rough sketch, it would appear rather to afford evidence of the comparative



unimportance of the patella in the ginglimoid motions of the knee-joint. It would appear to be difficult to believe that the detachment of a similar fragment from that portion of the condyle which moves upon the tibia could be followed by similar good results.

APPENDIX No. XI.

REMARKS ON ENTERIC FEVER, EXTRACTED FROM THE ANNUAL RETURN OF SICK AND WOUNDED OF THE BENGAL PRESIDENCY FOR 1877.

By Surgeon-General J. H. KER INNES, C.B.

ENTERIC FEVER, whether we regard it in relation to the mortality it causes; the long period of inefficiency which it entails on the soldier who is the subject of it; or the great loss to which the State is consequently subjected, is perhaps the most important of all the diseases making up the pathology of this country, for, it must be remembered that while the ravages of cholera, as an epidemic visitation, are more fearful, enteric fever is a disease of annual recurrence, and it is circumscribed within the limits of no particular locality, but it may even be said to be conterminous with the presence of the European soldier; it is pre-eminently *the* disease of which the young soldier dies in this country, and it is one, if not the chief, source of sickness and inefficiency in well nigh every corps and battery disembarked at Bombay, during its first and second years of service, notwithstanding that such troops may be distributed throughout the various stations of the three Presidencies.

Dr. Bryden, gathering up, as it were, the vast array of facts which his position as Statistical Officer with the Government of India commands, was the first to call attention to this fact which, based as it is on no theory, and supporting no foregone conclusion of any kind, is sufficiently striking, when once it has been pointed out, to arrest the attention of any candid inquirer desirous of studying disease as a subject of natural history or science. Out of 73 regiments and batteries which came to India between 1871 and 1877, nine only, he says, remained free from enteric fever in the first 12 months after landing.

Apart even from these considerations, which have a direct bearing on questions of State policy, there are other considerations as to the exact nature of the disease, and its dependence on causes such as have been ascribed to it by most European pathologists, the study of which possesses this very practical interest, that if the enteric fever of this country be not only allied to, but essentially identical in its nature and causes with that seen at home, we may then confidently anticipate that such causes being of a preventable character are as capable of being discovered and removed in India as elsewhere.

It is essential, first of all, that the points of similarity and dissimilarity or antagonism between the enteric fever of this country and Europe should be made clear.

Enteric fever has no geography; it is widespread, extending from the Rocky Mountains to the Himalayas, it is a disease of villages and hamlets, of rural rather than of urban populations, although frequently manifesting itself in the latter. By some, and not apparently without a certain measure of truth, it is considered to be more frequent among a flesh feeding than among a grain feeding population. On all hands it is agreed that it is a disease of youth and early manhood, that certain ages form powerful predisposing causes, and that, in fact, the structures (the intestinal glands) which form the nidus, and in which, so to speak, the morbid process has its rôle, cease to possess any physiological significance after the middle age.

Enteric fever, described under various synonyms, is a fever of varying degrees of severity and duration, but invariably lasting beyond a week, with an evening temperature of over 100°, and characterised by a tendency to abdominal symptoms, looseness of the bowels, the appearance of rose coloured spots, in successive crops, sparsely spread, and pulmonary complication; the disease is invariably connected with splenic enlargement, an infarction of the

peyerian and solitary and mesenteric glands, and commonly followed by ulceration, more or less extensive, in the former (agminate and solitary glands).

It is, of course, very commonly found that in any given number of cases of this, as of any other disease, one or other of the above characters, such as the exanthem or the diarrhœa, is absent. A description of disease has never the accuracy of a photograph, but there is no more difficulty in identifying this fever than any other, by its conformity as a whole to the characters (in the group) that define it. When, however, there are no characteristic symptoms, and the period of observation is limited, the disease cannot be diagnosed, its nature can only be surmised.

As regards its morbid anatomy the observation of Louis to the effect that in this disease it was not necessary to see the whole body, a few inches of intestine is sufficient to identify it, is practically quite true.

We may succinctly summarise the views regarding the etiology (causation) of this fever, from an European or British aspect, as follows :—

By some all organic, or animal, but especially fœcal, contamination of air or water is regarded as the cause, by others such contamination is regarded as not of an ordinary and indifferent, but of a very specific kind; that as an atom from a small-pox pustule, so a minute fragment of débris from the intestinal follicle of one the subject of the disease is capable of causing that disease in another and healthy person, and even of imparting its disease producing properties to other excrementitious matter with which it may come in contact.

The first set of pathologists and writers, while not at all denying the morbid potency and activity of such specific material, regard the view of those who contend that its presence is essentially necessary, those who would, like V. Gietl. Budd, Leibermeister, and others, trace the dependence and descent of one case from another in continuity, as far too exclusive to embrace all the facts, and they consider that indifferent, non-specific, organic matter is quite adequate, under certain circumstances, to originate the disease in question. At the same time it must not be forgotten that a third and large class of observers, looking to the geography of this fever, embracing arctic and tropical climates, and prevailing in plains and mountainous regions, manifesting itself under the greatest diversities of climate, altitude, soil, sanitary, social, and conservancy arrangements, have come to regard the positive doctrines advanced by the observers of one country in regard to the etiology or causation of this fever as either altogether inapplicable or as requiring much modification to adapt them to the same or similar occurrences in another country. Attempts have also been made, in a loose and indefinite way, to indicate the alliances between malarious disease and enteric fever, or what is denominated the antagonism, but which is in reality a sign of affinity and mutual relationship of these diseases, viz. : the alternation or substitution of the one for the other of them, the displacement, as it were, of one disease by the other, when regarded in relation to locality, time, or season.

So far as its clinical features and pathological characters are concerned, enteric fever appears to be everywhere essentially one and the same disease. As to its causation I shall speak hereafter. But the results derived from a perusal of the reports furnished to this Office, as well as my own personal observations of the cases themselves, leave no doubt whatever in my own mind that you can, and do, meet with numerous instances of a disease in this country indistinguishable from what is recognised as enteric fever elsewhere, and such as I have myself seen in Great Britain, France, Germany, and the Mediterranean.

That the exanthem is wanting in many cases, and the diarrhœa in others; that its character (as a fever) may be modified, and its fatality increased by heat and climate; that the disease may begin suddenly and with symptoms resembling ague, that it may indeed follow ague, exhibit a malarious character. or closely resemble some remittent or tropical form of disease other than enteric fever is nothing to the purpose. The fact remains that one of the most common diseases of India is indubitably fever averaging three weeks in duration, exhibiting the diurnal remissions of temperature, the abdominal and other symptoms of what is elsewhere known as enteric fever; that it is a very fatal disease, and, when fatal, that certain lesions, varying of course in their amount

and degree according to the duration and severity or otherwise of the case, are invariably found in the glandular structures of the small intestines and mesenteric glands.

That this fever is no new disease in India is almost certain. Dr. Bryden, whom I regard as one of the most profound and philosophical thinkers in our profession, and whose works contain on this and other diseases a mine of information and a vast assemblage of facts, arranged and systematised with an intelligent purpose almost unique in statistical science, has pointed out the very significant fact that the ratio of fever mortality (in the gross) of past years, if taken in relation to months and newly arrived regiments, is nearly absolutely identical with that of enteric fever at the present time.

And here it may be remarked that the number of admissions for enteric fever are not by any means to be taken as a reliable index of the actual number of cases; nor can a mortality of about 50 per cent. of cases treated be accepted as correct, the truth being that, although the exhausting effects of heat and heat apoplexy in this climate must be regarded as important factors in swelling the mortality, only those cases of the disease that are well marked in character and severe in type are denominated enteric fever; and it occasionally happens that the result of the post mortem examination determines the name of the disease. Here, as elsewhere, enteric fever varies in severity, ranging from the abortive and mild type up to the most grave and fatal forms of the disease. The former are probably never returned at all as instances of enteric fever, but are classified as simple continued fever, diarrhœa, remittent fever, &c.

One of the most powerful predisposing causes to this fever, and one universally recognised, is age. The greatest predisposition being between 15 and 30, and diminishing in proportion to the distance of the age from these limits. Fifty-two per cent. of the cases admitted into the London Fever Hospital were between 15 and 25, and 81 per cent, of all the typhoid fever patients admitted into the Dresden Hospital were from 16 to 30 years old. If such be the fact when the patients are drawn, as in Europe, from a population of all ages, it follows that we are, under the short service system, carrying out what partakes of the nature of an experiment, for the European military population in India consists almost exclusively of individuals within these limits of age, and the result has been to demonstrate here, as elsewhere, the truth of the same law. But Dr. Bryden, when he first called attention to this important question, coupled it with another and equally important factor, viz.,—recent arrival in India, under the combined influence of which the susceptibility to this disease is enormously increased.

The liability to die from enteric fever in the case of the soldier above seven years' service in India being 3·87 as contrasted with 82·44 in the young, and 13·69 in the class resident from five to seven years, reckoning liability at 100.

The relative prevalence of enteric fever in this Command, as compared with home and Mediterranean stations, is shown in the following table,—by which it will be seen (1) that the proportion which the enteric fever mortality in India bears to that of home is 1·53 to 0·24 per 1,000, while (2) in Malta and India it is nearly identical.

TABLE.

Enteric Fever.

—	Strength.	Admitted.	Died.	Ratio per 1,000 of Strength to		Remarks.
				Admissions.	Deaths.	
United Kingdom:						
1871 - -	99,331	81	22	0·81	0·22	
1872 - -	99,307	83	22	0·83	0·22	
1873 - -	95,767	128	30	1·33	0·31	
1874 - -	93,198	92	18	0·98	0·19	
1875 - -	92,802	91	27	0·98	0·29	
1876 - -	92,781	93	18	1·00	0·19	
Total - -	573,186	568	137	—	—	

—	Strength.	Admitted.	Died.	Ratio per 1,000 of Strength to		Remarks.
				Admissions.	Deaths.	
Gibraltar:						
1871 - -	4,428	15	7	3·38	1·58	
1872 - -	4 066	11	3	2·70	0·73	
1873 - -	4,341	8	4	1·84	0·92	In 1874 the admissions and deaths are not given in the blue book.
1875 - -	4,719	21	5	4·45	1·06	
1876 - -	4,695	35	—	7·45	—	
Total - -	22,249	90	19	—	—	
Malta:						
1871 - -	5,540	16	9	2·88	1·62	
1872 - -	5.447	32	11	5·87	2·01	
1873 - -	5,058	15	3	2·97	0·59	
1874 - -	4,756	5	—	1·05	—	
1875 - -	4,830	25	11	5·17	2·27	
1876 - -	4,878	50	13	10·25	2·66	
Total - -	30,489	143	47	—	—	
United Kingdom -	95,531	95	23	0·99	0·24	Average of 6 years.
Gibraltar - -	4,450	18	4	4·04	0·89	„ 5 „
Malta - -	5,082	24	8	4·72	1·57	„ 6 „
Bengal - -	37,044	139	157	3·75	1·53	„ 6 „

It would be interesting as regards Malta, therefore, to show how far the same influences, age and recent arrival in the Command, were in operation. In other respects there cannot well be a greater contrast (except as regards temperature) than exists between Malta and most of the stations in this Command, not only as to natural conditions, but as to barrack, conservancy, and social arrangements. Be this as it may, the next question is the relative value of these two factors—age and recent arrival. From the same authority I gather—

* * * * *

"Deaths of regiments in the first and second years of Indian service, and their causes, shown in relation to age, on the experience of the period 1871–76.

"Strength of arrival of regiments which came to India from 1871 to 1875:—

	Strength of the Body.	20 to 24.	25 to 29.	
	22,758	10,754	4,426	

"Deaths in first two years of Indian service, and the death-rates at the different ages:—

Cause of Death.		Died per 1,000 of Strength in the Biennial Period.		Ratio of Liability in Per-centages.		
		Under 24.	25 to 29.	Under 24.	25 to 29.	
Enteric fever -	*	9·7	10·16	44·31	46·08	*

* * * * *"

If these observations be true it would apparently follow that it makes but little difference whether a soldier landing in this country for the first time be 20 or 25 years of age so far as his chances of dying of enteric fever are concerned. The average expectation of life diminishes in this country as at home in proportion to age; a young soldier, say of the age of 20, has a better chance

of life in India than one of 25, but if he dies within the first two years of his service here the chances are just as likely that he will die of enteric fever as of all the other diseases put together. On the other hand, while the soldier of 25 years of age dies of this fever, under similar circumstances in about the same ratio as one of 20, the mortality among the former from other causes is increased.

So far then as can be inferred from statistical deductions it would appear that, even if we could obtain recruits of a maturer age, and it is questionable how far a man could be drilled and made into a soldier at 24 or 25 years of age, we have no guarantee that the mortality from Indian diseases would be sensibly diminished, although the inefficiency from sickness might be. It being impracticable, however, to recruit our army with older men, and assuming that a recruit should not be sent out to this country under 20 years of age, nor until he has learned his drill, we are driven to inquire whether any measures can be adopted in India for obviating or diminishing the annual losses from enteric fever among this class of men?

And, obviously, the question of causation is intimately connected with the answer. If the enteric fever of this country be a specific fever depending upon a specific poison, and assuming—what is certainly required to sustain the theory of a continuous transmission of the disease—that the poison, or materies morbi, is capable of retaining its vitality or activity for long periods of time outside the body, and that the appearance and disappearance of the disease (with widely separated intervals of time) in a given locality where it has once become established may consequently be accounted for without the introduction of any fresh case; or if it be essentially a filth fever and originates spontaneously from pythogenetic causes, then we can on the first assumption limit the spread of the infection; and, on that of the second we should be able by well directed efforts to secure its extinction as far as military cantonments are concerned.

If the disease is maintained and spread by infection it can only be accounted for by, first, importation, secondly, by one or other of the following: infection, contamination of air, water, milk, or other beverages, soiled linen in connexion with washing arrangements, a common latrine, conservancy arrangements, the extension of the disease from the natives, or from something connected with their habits.

I. *Importation.*—A recruit is on an average one year at the depôt before he joins the service companies of his regiment; he embarks in October, say, on board one of Her Majesty's Indian troop ships, and is about a month on the voyage out. As a rule enteric fever manifests itself in India at the end of April or beginning of May, frequently re-appearing at the end of the monsoon season (end of August). It seems very pertinent here to remark that April, May being the hot and dry season, the well water is probably at its lowest, while in September, the end of the monsoon, it is at its highest level; these two opposite conditions being coincident with the two periods of maximum prevalence of the fever in question. In Europe, on the other hand, this fever is at its maximum in autumn, diminishes during the winter, and disappears in the spring. It is, of course, fairly open to question whether the conditions present at certain seasons do not supply the necessary stimulus to the activity and development of the cause (materies morbi) rather than that such conditions themselves form the cause.

The men proceeding to India are carefully inspected before embarkation, there is no evidence to indicate that they have been infected with enteric fever in England. The returns of diseases fail to afford any indication of the prevalence of enteric fever among the troops on shipboard; on the contrary, the health of the troops on the outward voyages has been remarkably good, and they have, as a rule, been singularly free from infectious diseases. The period of incubation ordinarily assigned to this fever would preclude the possibility, moreover, of such an interval of time having elapsed between the exposure to and contraction of the disease and its subsequent manifestation, as must be pre-supposed in the cases under discussion; and assuming the presence of any infectious material conveyed in the clothes from one country to another, we are driven to adopt views entirely at variance with recorded experience, in regard to the infective character of this fever, to say nothing of the extreme improbability of nearly every detachment of troops bringing out

with it the germs of a specific disease in this way, ready for development at a given date.

II. *Fœcal contamination of air, water, &c.*—The subjects of enteric fever are generally in good health at the time of attack, and, however much, fatigue, intemperance, starvation, and overcrowding may predispose to or determine the incidence of the disease in the individual, or favour its development in a community, it is generally recognized that such causes are inadequate to originate enteric fever, which, in this respect is unlike typhus and relapsing fever.

The conservancy arrangements in India are very different to anything of the same kind in Europe. It would be too much to say that there were no exceptions, but a military cantonment is, as a rule, maintained in a very cleanly and sanitary state. With the exception of drains for the purpose of carrying off rain water and the overflow of bath and ablution rooms, there are no sewers in India, no soil pipes to get out of order, nor waste pipes connecting cisterns with drains, no cesspits to admit of soakage into the surrounding soil and contamination of the water supply.

The latrines and urinals, in a well kept barrack or hospital, are models of cleanliness; the ordure is no sooner deposited in vessels than it is covered with dry earth and deodorised; it is promptly removed in air-tight iron receptacles and, together with offal, &c., buried at a distance from the cantonment, the ground utilized for this purpose being ploughed and cropped.

The wells are covered, surrounded by a good parapet, and filtration of water is never omitted. It is difficult to understand how fœcal matter can get into them, but still more difficult to understand how this cause should obtain at all the stations where enteric fever is found to prevail, and why, if present, it should (speaking broadly) cease to affect a corps two years after its arrival in this country. On the other hand it is undoubted that water becomes fouled by being stagnant in wells; that an increase in the amount of organic matter in it has arisen from this cause, and that the prevalence of such diseases as enteric fever and cholera have been, no doubt rightly, attributed to the use of such waters.

If it could be shown that enteric fever was a disease of the native population, then, indeed, we should not have to go far to seek for the fever germs or specific elements of enteric fever; for, from their habits, it is quite conceivable that minute particles of fœcal matter, dried and pulverescent, should be blown about by the wind and deposited in wells or elsewhere. But enteric fever would seem to be an exceptionally rare disease among them. Taking the medical history of the native jail population of the Bengal Presidency for a number of years, from 1871 to 1876 inclusive, representing in the aggregate upwards of 398,000 individuals of different ages, we find that only 28 are returned as dying of enteric fever, and it is to be remembered that in some cases the diagnosis was not verified by post-mortem examination, and in others the assigned age of the patient would almost, if not altogether, preclude the probability of such an occurrence. Moreover, a distinct outbreak of this disease on any large scale in any one of these institutions has never taken place.

As the medical officers of both the British and Indian medical services have been drawn from the same medical schools, and educated in the same doctrines, and do not fail to recognise cases of enteric fever when they occur in Goorkha regiments, we are driven to the conclusion that this is not, to say the least, one of the common and recognised diseases of the native population. It is a possible hypothesis, of course, that, as enteric fever is a disease which does not repeat itself in the same individual, the natives may suffer from that disease when young, and that, under the name of diarrhœa, it may escape detection, but there are no facts to sustain this assumption.

Water supply to troops en route from Deolali to Allahabad.—Water is taken from wells, carried in mussacks and served out to the men whenever they require it while travelling by railway; no filtration. In the rest camps Chatty filters are used, and a Macnamara filter or two at Allahabad. Previous to the trooping season all the stagnant water in the well is pumped out so as to secure water fresh from the spring. The process of filtration is so slow in the Chatty filters that one filter cannot supply drinking water for more than a few

men; and soldiers while washing, will often dip their mugs into the "washing water" and take a drink.

Milk.—The arrangements are varied, and depend entirely on the orders of the commanding officer. In some corps, cows and goats are brought at certain stated hours to the barracks and milked in the presence of the regimental police, the pure liquid being taken away by the purchasers; in other cases, milk is brought in earthen or metal vessels (of course highly adulterated) and sold to the people of the corps at the canteen, or taken round from barrack to barrack by the seller. The feeding of cows, in the dry season especially, is frequently of a filthy character; grass &c. being scarce, the animals are driven to any place where stable litter can be procured, and allowed to feed.

Water for cooking purposes.—Several plans are adopted.

1st. Water from the filtering tank (where such exists) is carried in metal buckets to the kitchen, and there put in a metal boiler.

2nd. Water from Macnamara filters is similarly carried.

3rd. Water is taken direct from wells in mussacks to the kitchen.

It not unfrequently happens, spite of all attempts to prevent it, that natives bathe and wash their clothing on the cover of the well, and a small quantity of water must find its way back to the well, both directly and by soakage.

Beverages.—The beverages usually used by the soldier are; tea, coffee, aërated waters, and ginger-beer (pop). Tea and coffee are sold at six pies per cup, and to make a profit the drinks must be inferior; aërated waters, fairly good; ginger beer is sometimes a palatable and wholesome drink in the hot weather, the reverse during the rains and winter. The water used for these beverages is commonly unfiltered.

Cooking.—All cooking is done by the natives, squatted on the ground. No stoves are used, but simple earthern-brick and earth walls (semi-circular) about a foot in height, on which rests the boilers. This system necessitates a separate fire for each vessel; the vessels are made of copper, tinned twice a month; rations are drawn daily for the day of issue; bread is taken direct from the ration stand to the barracks; meat and vegetables are taken to the cook-house and cut up by the natives on small, low, wooden tables or blocks not always the cleanest, or where it may and often does become contaminated by flies. A soldier may have his food cooked in any way he chooses, but the majority have either a "fry" (not roast), soup and boiled meat, or curry. The cooking is fair, but the native cooks are, as a rule, filthy. The arrangements for washing plates, teapots, &c. are very imperfect, this does not, however, apply to the boilers, which are well cleaned with moist sand or clay. If the scale of kitchen utensils be referred to, it will be seen that the articles allowed are not such as to secure cooking being cleanly done. The hospital cooking, however, is everything that could be hoped for under these defective conditions.

Washing.—The washing of soldiers clothing is either done in a large pond (which depends on the rains for the water supply) or in a running stream. This latter is the exception, as unless it is in the vicinity of the station, the washermen will not resort to it.

On the admission of a soldier into hospital, his clothing is returned to his company, and the dirty linen, flannel, &c., is made over by a non-commissioned officer to the dhoby, with the dirty clothing of the men of the company: all the clothing &c. is mixed up, taken away and washed together in a pond or stream, and brought back together to the company. If it is found that the patient is suffering from a contagious or infectious disease, the bedding, clothing, &c., is disinfected in the hospital before being made over to the regimental authorities. It sometimes happens, although the practice is forbidden, that the company dhoby washes also for a number of natives (bazaar and barrack), and their filthy clothing is then mixed up with that of the soldiers, washed, and carried with it. Soap is seldom used. The pay of the dhoby (usually 10 or 12 annas per man per mensem) will not admit of soap or other cleansing materials being employed, If the pond be dirty, the clean (?) clothing will have the appearance of being washed in dirty water; but as a soldier seldoms wears anything white (except his tunic and trousers in summer) bad washing is not recognised. These ponds are frequently resorted to for watering herds of cattle, and buffaloes may occasionally be seen sitting in a pond a dozen yards away from the washermen.

The experience of the connexion of enteric fever with local filth causes has

been elsewhere so constant, and the occurrence of an outbreak or "household epidemic" of this disease has been so frequent, where the circumstances indicated the action of a common cause, or where the sequence of events was such as to leave no doubt of its infectious character, that it would be unjustifiable (except on the strongest evidence) to set aside such experience in favour of the view that this disease was in India attributable to no assignable cause other than youth and climate (heat, &c.); that it was in fact a seasoning fever. I take it that in any case, we are bound to search every channel and eliminate every assigned cause before ascribing it to general ones over which we have little or no control. This is the view which I have striven to impress upon medical officers, and great prominence is given to it in the official reports which are required in all cases of the fever in question. Making every allowance for carelessness on the part of some, and for the tendency inseparable in all official systems of registration and reporting, to execute clerical work in a perfunctory manner, or to assign some cause or other without considering its relevancy or adequacy, medical officers have utterly failed in India to trace out the intimate connexion of this disease with filth causes, or specific infection, with which, according to European authorities, it is invariably associated. Such failure has certainly not been due, in many cases, to any want of zeal on the part of medical officers who, convinced of the correctness of the doctrines in which they have been educated and of the results of their previous experience, have striven to harmonize their convictions with the results of their Indian experience.

While, however, I am very sceptical as to the applicability or adequacy of the causes assigned by European authorities to account for all, or anything like all, the facts in this country, I would, on the other hand, particularly guard myself against being supposed to deny their existence; on the contrary, there is no doubt that enteric fever is an infectious disease capable of spreading in a community under certain circumstances, and of adhering to and forming part of the medical history of a corps for a long time: that many cases are traceable to a common cause, such as contaminated water or organic laden air. But then the facts will make up a consistent history: the concurrences of cases will be too numerous to be coincidences, but will be indicative of some community of cause; and the evidence will not be wanting, even where we fail to trace the exact cause, to indicate the harmony, the relation, of the phenomena one with another.

I insert here a few illustrations, taken almost indiscriminately and mainly from the records of enteric fever mortality of corps serving in India, which will suffice to illustrate the widely-spread distribution of the disease, the typical experience or medical history of a regiment, quoad enteric fever, for the first three or four years of its service here, and other direct or collateral points connected with the subject.

The 11th Brigade, Royal Artillery, arrived at Bombay in February 1874. A and B batteries went to Barrackpore, C battery to Dinapore, D battery to Benares, E battery to Allahabad, F battery to Saugor, and G battery to Nowgong.

A battery (Barrackpore) lost two men from enteric fever, both 22 years of age, and six months in the country. B battery, at the same station, had two cases; the first (aged 24) was likewise the first case of the disease, died on April 18th, after having been only two months at the station; the second (aged 22) died in August at Dum Dum after five months Indian service.

C battery, at Dinapore, lost five cases (one being returned, however, as remittent fever). Two only of these were over 25 years of age, and they had only been from one to three months in the country.

D battery, at Benares, lost four men (one returned as remittent fever), three of whom were over 25 years of age; their length of Indian service ranging from six weeks to seven months.

E battery, at Allahabad, lost two men, both aged 21, and of two and seven months Indian service respectively.

F battery, at Saugor, lost four men from enteric fever, the oldest of whom was 22, and they had nine months Indian service.

Lastly, G battery, at Nowgong, lost three cases (one returned as remittent fever), two of whom were over 25 years of age, and their Indian service ranged from two to five months.

Years.	Barrackpore.		Dinapore.	Benares.	Allahabad.	Saugor.	Nowgong.
	A Battery.	B Battery.	C Battery.	D Battery.	E Battery.	F Battery.	G Battery.
1875	1	1	2	1	—	1	—
1876	2	1	—	—	2	1	—
1877	—	—	1	—	—	2*	—
1878	—	—	One admission in June at Meerut: still remains under treatment.	—	One admission and death in July at the Kasauli depôt.	—	—

The marked tendency which the disease has shown to appear at certain seasons (April, May, August, and September), as if in response to the action of some seasonable conditions at those times, is a notable fact in the foregoing medical history, but the evidence of this would have needlessly extended and involved the narrative.

The 4th Brigade, Royal Artillery, arrived in India in February 1875, and its batteries were distributed in the following stations of the Bombay Presidency:—

4th Brigade, R.A.	Station.	Cases of Enteric Fever in 1875.
A Battery - -	Baroda - -	Three fatal cases of fever in April.
B " - -	Deesa - -	One case of enteric fever. March 24.
C " - -	Belgaum - -	Two cases of enteric fever in April.
D " - -	Kurrachee - -	Six deaths; five returned as enteric fever and one as continued fever. (July and Sept.)
E " - -	Kirkee - -	None.
F " - -	Ahmedabad - -	One case of enteric fever in December.
G " - -	Nasirabad - -	One case of enteric fever in September.

The 1/17th Regiment arrived in this country from England in the beginning of March 1870, before it became customary to designate this form of fever by the terms typhoid or enteric fever. The regiment proceeded to Lucknow, and on April 12th—that is, about a month after its disembarkation—the first death from continued fever occurred; another took place on the 18th, followed by nine in May, the total deaths from this cause for that year being 16, the last case (in December) being registered as febris cont.: typhoid. With the exception of four, all were under 25 years of age.

In the following year (1871) six deaths occurred from typhoid fever, 22 years being the age of the oldest.

In 1872 three deaths occurred from the same cause, the last victim being 36 years of age. In 1873 only one death (that of a recruit, aged 18) is recorded under the head of "enteric fever," and in 1874 none.

The 40th Regiment arrived at Bombay from England in December 1872. It went to Lucknow, and during the following year it lost 10 men from enteric fever, the oldest of whom was 25 years of age, their Indian service ranging from four to nine months. One of the deaths occurred at Dagshai.

In 1874 five men died of that fever (one of them being returned as remittent fever), the corps being still at Lucknow.

In 1875 two deaths occurred from the same cause at the same station.

In 1876 one death from remittent fever is returned at Barrackpore, the head-quarters of the regiment being at Dum Dum.

In 1877 one fatal case of remittent fever is returned from the regiment at at Barrackpore, and for the present year (September 1878) no fever deaths have occurred.

The 4/60th Regiment embarked from England on 2nd November 1876, and disembarked at Bombay in December following. It proceeded to Agra, and was quartered in the military cantonment and fort at that station.

In the former - - -	588
In the latter (Fort) - - -	104
Total - -	692

* One had a little over 18 months' Indian service.

In the course of the year the regiment was distributed as follows:—Dagshai, 80; Landour, 51; Naini Tal, 21; Kasauli, 2; Charkrata, 2; Agra, 583.

At Agra five deaths occurred from enteric fever, two of which took place among those stationed at the fort, a considerable distance from the cantonment lines. The age of the oldest was 36, that of the others 23 and under, and their Indian service ranged from one to nine months.

At Dagshai the total strength of various corps was 1,125; the depôt, 4/60th (80 strong), gave seven admissions and three deaths out of a total of eight cases for the station.

At Landour, out of the small body of convalescents, 4/60th, there were two admissions in May, but no deaths.

Since the beginning of 1878 to the present date (September) there have been nine cases in all; one officer and three men at Kasauli, and five cases at Agra. Surgeon-Major Cherry, in medical charge of the corps, in his annual report for 1877, remarks:—"There were 20 cases among the men and two among "the women. Of these 7 occurred at head-quarters in the European Infantry "Barracks, six at Agra Fort, seven at Dagshai, and two at Landour. The "average age of those attacked was 21½ years, the eldest being 36, the youngest 19. In all the cases that came under my notice the disease was well "marked, and there could not be any mistake about it."

The fact is noted that the excreta of the sick were specially dealt with, and removed to a distance and buried.

The disease commenced to show itself as early as January; the cases did not come from any single barrack. At the latter end of April and beginning of May, coincident with the accession of the hot weather, and in conformity with the history of this disease in India, the cases became more numerous, both in the detachment at the fort and head-quarters, and, on the advice of the Medical Officer, all the wells from which water was supplied for the use of the troops were emptied, cleansed, and purified. The organic matter in the water was by this measure reduced from 5 or 6 grains to 2 or 2½ per gallon. From that time (May), with the exception of two cases—one at the Fort and one at the Infantry Barracks—the troops have not suffered from the fever in question. The Medical Officer, while remarking that this may have been a coincidence, is naturally disposed to associate the prevalence of the disease with the character of the water supply; and he offers the practical suggestion that, whenever the drinking or culinary water contains more than 2 to 3 grains per gallon of organic matter, the wells should be emptied, cleansed, and purified with lime and permanganate of potass. It is, of course, necessary to bear in mind the occurrences which were elsewhere taking place in the detachments of the regiment before attributing the disease at Agra to the causes assigned for its occurrence there.

The 73rd Regiment during 1877 was 850 strong, it was stationed at Subathu during that and the preceding year, and suffered very much from fever. The medical history of this regiment presents many points of interest, and especially in regard to the prevalence of enteric fever in it. The 73rd arrived at Cawnpore in 1874, having come from Colombo (Ceylon), where it had been for some years previously. In Colombo during 1873 there were returned 1 fatal case of enteric fever, 10 cases of remittent, and 6 of simple continued fever. In 1874, 3 deaths from enteric fever were reported; in 1875, 7 cases and 2 deaths; in 1876, 8 cases and 2 deaths; and in 1877, 18 cases and 5 deaths, among the men, 6 officers, 1 officer's wife, and 1 woman, from the same fever, in addition to a large number of cases of remittent and simple continued fever (65), were returned.

In passing, it may be remarked that at Cawnpore the water is pure in quality and very free of organic impurity. The station is (speaking generally) occasionally visited by cholera, and when regiments or drafts newly arrived in India are quartered there, enteric fever has prevailed, but not otherwise.

It will be seen that the 73rd differed from most newly arrived regiments in this, that the prevalence and mortality from fever increased instead of diminishing after the first year or two of Indian service.

The regimen in 1871, whilst at Colombo, suffered from a severe form of remittent fever (approaching the yellow fever type). The outbreak of this disease was attributed to emanations from a canal, which was also a sewer; the disease recurred annually to some extent. When the regiment arrived in India it had already lost a man (the previous year) from enteric fever, and

from that time to the present date (1878) the 73rd has not been free from that disease; the last case was in August of the present year. The regiment was a fever stricken regiment, the fever, in the words of the medical officer, was *in* the regiment, endemic. Without entering into needless detail, I think the following may be fairly deduced from a careful perusal of the returns and reports, and from statements personally made to me by one of the officers attacked.

The regiment was an infected regiment; at Cawnpore it suffered from enteric fever much in the same way but to a less extent than regiments newly arrived generally do. The regiment took part in the Delhi camp of exercise during the early part of the year 1876, and arrived at Subathu in February 1876. Enteric fever prevailed in the winter and spring, a case occurred as early as March at Subathu and cases continued "cropping up" until November.

Now Subathu is situated in the lesser range of the Himalayas, about 20 miles from the plains, at an elevation of some 4,000 feet. Its soil and subsoil consist of disintegrated shale, so that the station is exceedingly dry, rendering cultivation very difficult; the trees do not grow well, and those indigenous to the hills are rapidly disappearing owing to the demand for firewood. There is nothing to impede the progress of clouds or protect it against the sun's rays, consequently the temperature is high and there is little difference between its range day and night. The water supply is very limited during the hot season, but at other times quite sufficient for the use of the troops. It is obtained from two springs close together at the outskirts of the cantonment at its south-west angle and about 154 feet below the level of the barracks. The springs are enclosed by solid masonry, the water is led some distance (about 30 feet) to solid masonry tanks from which it is pumped into leather bags and conveyed to barracks on mules for distribution into the Macnamara filters which are in general use for drinking purposes. The water required for culinary uses is distributed direct from the bags; the quality is excellent although hard, the limited supply must increase the dangers of contamination, and also the liability to have impure water from other sources brought to the barracks.

Judging from the records of this station, Subathu has not a good reputation (quoad enteric fever), its native bazaar is close to the soldiers lines and below them. In addition to the disadvantages indicated above, there was some overcrowding of the men in barracks; the Khuds were in an insanitary state, foul smells emanated from them and were perceptible enough, when carried by the winds, to the inmates of some of the barrack rooms and officers quarters; there was not that amount of segregation and dispersion of the sick that was desirable, and the source and amount of water supply was not altogether satisfactory, for although there are two covered wells under lock and key for the use of the troops, there are also numerous uncovered wells about the station, and it is, of course, possible that water was obtained occasionally from the latter by the bhisties.

The 1/25 Regiment (Fyzabad). The medical history of this corps, in relation to the disease in question, was fully set forth in the report of the medical officer. The corps arrived at Fyzabad in 1876, and it contained a good many young men, the circumstances pointed with much probability, at any rate, to a connexion between the prevalence of the fever and the use of contaminated well water (vide A.M.D. Report for 1876, page 142).

In the year under report (1877) Dr. Gribbon (a thoroughly competent and painstaking officer) was only able to identify one case of enteric fever, and nothing has occurred in the subsequent history of the corps to invalidate the conclusion arrived at in regard to the causation of the fever in the previous year.

There are some observers who hold that all portions making up the pathology of the diseases of the different seasons of this climate are interdependent, that, in fact, however different in appearance and manifestation, they are indissolubly connected as branches of the same stem, and such persons would include cholera, intermittent, remittent, and enteric fevers as malarious diseases. Although these diseases comport themselves in many respects as if they had etiological alliances with a malarious cause, still there are several facts which do not appear to harmonise with this view, the discussion of which must, however, for the present be deferred, but it may, meanwhile, be

remarked that May, the enteric fever season, is the least malarious period of the year in India. The stations that furnish the largest admission rates for malarious fevers do not contribute a proportionate amount of enteric fever, and, lastly, cases of enteric fever are not benefited by quinine in the way that we should expect on the assumption of this malarious connexion, indeed, only the other day Surgeon-Major Hanbury, 15th Hussars, Meerut, called my attention to a number of cases (recovered) of undoubted enteric fever which, from first to last, had never received a grain of quinine.

In many instances the occurrence of this disease followed so soon, one or two months or less, after the arrival of a corps in this country, as to lead to the inference that it must have been contracted on the way up from the port of disembarkation, and I have consequently endeavoured to ascertain whether the same thing was common to all newly arrived corps, but it is not. It would seem that the nearer the time of arrival is to the hot weather, the less the interval before the fever makes its appearance.

The 54th Regiment arrived at Jullundar from England in December 1871, in 1872 the corps had 12 fatal cases of fever, five returned as remittent fever, but the 12 were no doubt enteric fever, the first occurred on 10th May.

1/18 Regiment arrived in India in January 1875. One wing went to Moradabad, the other to Bareilly. The first case of enteric fever at the former station was in June, six months after arrival, the other at Bareilly was in March, upwards of two months.

81st Regiment arrived from Gibraltar in November 1874, went to Jullundur and had no enteric fever until May 1875 (total admissions six and deaths five in 1875).

100th Regiment arrived at Bombay on 10th November 1877 and went to Jullundur. One case of enteric fever fatal on 5th June 1878, aged 21. Indian service seven months.

72nd Regiment arrived in India on 24th March 1871 and went to Umballa. One death from enteric fever occurred in September and one at Kasauli in July; in 1872 five deaths at Umballa during August and September, and one case at Kasauli.

TABLE showing the RELATIVE PREVALENCE and MORTALITY of ENTERIC FEVER among REGIMENTS located both at HILL STATIONS and DEPÔTS and STATIONS on the PLAINS from 1871 to 1877, inclusive (from April to October in each year).

Years.	Strength.	Admitted.	Died.	Ratio per 1,000 of Strength to		——
				Admissions.	Deaths.	
						Hill Stations and Depôts.
1871 -	4,650	1	1	0·21	0·21	Darjeeling Pachmarhi, Ranikhet, Chakrata, Dagshai, Subathu, Jutogh, Bhagsu, Murree, Cherat, Kasauli, Banikhet, Khyra Gully, Solon.
1872 -	4,300	7	7	1·62	1·62	
1873 -	5,000	13	3	2·60	0·60	
1874 -	5,700	9	3	1·57	0·52	
1875 -	6,050	3	2	0·49	0·33	
1876 -	6,800	32	9	4·70	1·32	
1877 -	7,000	31	11	4·42	1·57	
Total -	39,500	96	36	—	—	
Average of 7 years -	5,643	14	5	2·48	0·88	
						Stations on the Plains.
1871 -	4,619	24	7	5·19	1·51	Barrackpore, Hazaribagh, Allahabad, Dinapore, Benares, Cawnpore, Lucknow, Sitapur, Fyzabad, Bareilly, Moradabad, Shajanpur, Morar, Fort Gwalior, Jhansi, Saugor, Meerut, Agra, Delhi, Roorkee, Muttra, Umballa, Jullundur, Mean Meer, Ferozepore, Sialkot, Rawal Pindi, Campbellpore, and Peshawar.
1872 -	4,385	22	13	5·01	2·96	
1873 -	4,978	42	20	8·43	4·01	
1874 -	5,693	60	29	10·53	5·09	
1875 -	6,050	20	11	3·30	1·81	
1876 -	6,804	51	22	7·49	3·23	
1877 -	6,984	44	17	6·30	2·43	
Total -	39,513	263	119	—	—	
Average of 7 years -	5,645	38	17	6·73	3·01	

TABLE of ENTERIC FEVER at CONVALESCENT (HILL) DEPÔTS from 1871 to 1876, inclusive. These Stations are occupied from April to October, and cover the Enteric Fever Seasons; the average strength may be taken as 2,000 during each hot season.

Years.	Enteric Fever.		Remarks.
	Admissions.	Deaths.	
1871	1 Dalhousie - 3	0.	
1872	2 Naini Tal - 3 0	0.	
1873	1 Naini Tal - 3 2 Kasauli - 3	1 Kasauli.	
1874	1 Naini Tal - 1 Landour - 3 1 Kasauli -	1 Landour.	
1875	1 Kasauli - 2 1 Murree - 2	1 Kasauli. 1 Murree.	
1876	1 Naini Tal - 3 2 Murree - 3	1 Murree.	

The amount of enteric fever among a number of troops stationed in the hills, as compared with a similar number of troops (taken indiscriminately) in the plains is strikingly in favour of the former; but this result is more apparent than real, for we must bear in mind that the susceptibility of recently arrived regiments or men to attacks of this fever is so great that unless we know the composition of the bodies of men, in regard to age and length of service in India, the results of a comparison must be vitiated. Speaking generally, then, recently arrived corps do not go to the hills but to some station in the plains. It would extend this report to needless length to set forth all the details, but having analysed the facts and gone over the records of this fever at hill stations from 1871 to 1877 inclusive, I find that more than half the deaths from it occurred among men under 25 years of age and of less than three years Indian service, and this was strikingly manifested in the case of corps of long Indian service, for the victims in such corps were from the drafts, young men relatively recently arrived in India.

In the case of the 4/60th Rifles, as we have seen, arriving in India in September 1876 we have a strength of 87 stationed during the hot season of 1877 at Dagshai, and 583 at Agra, with seven admissions and three deaths from this fever in the former body, and 13 admissions among the men and two women in the latter (at Agra), and out of a total strength at Dagshai of 1,125 of various corps, this small detachment of the 4/60th furnished seven out of the eight enteric fever admissions at Dagshai.

In the foregoing remarks I have endeavoured to set forth the facts connected with this disease as it prevails in India and the impressions which they have left on my mind. It is difficult, with every desire to be impartial, to eradicate the effect of previous education, especially when corroborated by the results of personal experience, and certainly the character of my own mind would rather impel me than otherwise to a belief in specific diseases being invariably the product of specific causes as a logical conclusion. Among executive medical officers clinical observations usurp the first place; it is only in some central office that an opportunity is afforded for consolidating and comparing a large number of facts derived from various sources, but the labours of both are obviously equally essential to a thorough appreciation of the subject.

While fully recognizing, then, the force of the evidence on which European pathologists dwell in regard to the specific nature of enteric fever, and its connexion either with specific or filth causes, it is impossible on the other hand to resist the evidence that such causes fail to embrace all the facts observed in this country. It may be urged, as it has often been urged before, that when confronted with the positive observations of repeated occurrence in Europe, negative evidence is of very little value. amounting as it does to our inability to trace the continuity of a chain of causation the connecting links of which are necessarily invisible; but the (well nigh) universality of the disease here, its connexion with age and recent arrival of its subjects, and the seasonable

regularity of its appearance, its continuance and disappearance in a newly arrived corps within definite limits of time, are in themselves positive evidence, facts that must be reconciled with any theory which claims to be true for India as well as Europe. They point to a remarkable susceptibility to this disease at any rate on the part of young men during their first year or two of Indian service, and this compels us to inquire whether there may not be something in the climate itself and the new conditions of life here, irrespective of any specific cause or any filth cause even, capable of originating the disease in question.

It would be easy, but out of place in an official document, to dwell upon the minute anatomical (structural) relations of the various abdominal organs susceptible of diseased action here—the liver, spleen, peyerian follicular system—and inquire whether all the diseases (except cholera) making up Indian pathology have not also some causal relation to one another; in the young and newly arrived man manifesting itself as enteric fever, in the older and longer residents as hepatic or splenic disease; and whether the greatly increased physiological activity of the peyerian glands at certain ages does not render them peculiarly liable under the influence of heat, climate, &c., and the altered physiological relations of the skin to pass from the physiological to a pathological condition, in other words become infarcted with a material the subsequent changes in which result in the morbid lesions of Indian enteric fever.

The practical outcome of the preceding remarks may be summed up as follows :—

I. That although we have no sufficient data to warrant us in saying that the location of recently arrived troops in the hills would confer an absolute immunity from enteric fever on them, there can be little doubt that it would materially diminish its prevalence. Unfortunately hill stations have, for statistical purposes, been frequently credited with sins not their own; that is to say, men of infected or sickly regiments have been sent to the hills to manifest there the symptoms of a disease contracted in the plains; and in other respects it is difficult to gauge accurately what has been the effect (quoad enteric fever) of hill stations. Still, it cannot be doubted, on the grounds of physiology and common sense alike, that the nearer the climate in which the young soldier is stationed in India is to that he left the better, and that setting aside the relative immunity from cholera conferred by elevation, and limiting ourselves to the fever question, we have sufficient evidence to indicate our power to diminish the young soldier's susceptibility to it by subjecting his constitution gradually to climatic changes, so that it shall have the power of physiologically accommodating itself to them; and the short service system, which is already beginning to have its effect in diminishing the number of married soldiers, will in time place a greater amount of accommodation in the hills at the disposal of the Government. (There were about 2,000 women and children less in India in 1877 than in 1874.) There were 9,185 men, 964 women, and 2,135 children of this Presidency stationed in the hills during the hot season of 1877; or 25·46 per cent. of the men, 29·90 per cent. of the women, and 32·73 of the children.

II. That the more men are engaged in the open air, dispersed instead of aggregated together, the better will be their health, and this can only be accomplished, of course, where the conditions of climate admit of it; the experience obtained by the employment of troops in road making is a case in point. It would surely be practicable to utilize the services of soldiers in this country in hutting themselves, and, when so hutted in a temperate hill region, in occupying themselves in various duties connected with the internal economy of a regiment such as are delegated to the natives.

III. That the arrangements for water-supply to the troops on the line of rail and at the rest camps probably admit of improvement, but this will involve the expenditure of money and the exercise of much vigilant supervision. The supply of water to rest camps is in principle the same as to barracks.

IV. That greater uniformity of practice is indicated in regard to the internal economy of regiments in the matter of protecting the wells and water supply, and against what may be termed "chance" pollution in the washing and culinary arrangements and the milk supply. It is obvious that, however much

Government may be desirous of aiding in this respect, an immense deal must depend upon commanding officers and medical officers.

V. The seasons, April—May and the end of the monsoon (August—September), being those in which this fever especially manifests itself, too much consideration and care cannot be given at these times, in the case of young soldiers especially, to avoid all unnecessary exposure (drills, &c.). This is, however, already enjoined, and is believed to be acted upon.

VI. But what I would suggest is a practical experiment by way of testing the effect of hill stations on the health of newly arrived corps. Let a small station such as Chakrata, for example, be selected, to which a regiment should at once proceed on its arrival at Bombay in the winter season; provide good water supply, and ensure that its purity is maintained, and see that the conservancy, drainage, washing, and cooking arrangements are practically as good as they can be; enlist the co-operation of the commanding and other officers in carrying out such experiment by explaining to them the object of it, and place the corps in medical charge of an officer specially selected for his intelligence and practical acquaintance with the fever in question.

As there has been a recurrence of this fever in the 4/60th Rifles this year (1878) this office addressed a memorandum to the medical officer in charge, Surgeon-Major Hession, directing his special attention to Surgeon-Major Cherry's report of last year, and making specific inquiries as to the existence of the usually assigned causes of the fever in question. The following is an abstract of the facts furnished by Dr. Hession.

He states that he has read Surgeon-Major Cherry's remarks on the cases of enteric fever embodied in the Annual Report for 1877, and noted that he was inclined to attribute the existence of the disease to impure water.

The circumstances under which the present outbreak made its appearance presented no noteworthy climatic or other peculiarities. The hot weather had passed over, and monsoon season set in, although little or no rain had fallen; the last week in August was marked, however, by a heavy rainfall, and soon after the first showers the fever made its appearance. That there was an intimate connexion between the rainfall and the subsequent outbreak he believes, but in what manner it acted as an exciting cause he is not satisfied. The drinking water supplied to the battalion was soft and rather brackish; nevertheless, it was drank by the men all through the hot weather without any evil result. Samples of water have, however, been forwarded to Roorkee for analysis, taken from the two wells used by the regiment for drinking purposes, and the officer commanding the station has been requested to have all the wells which supply drinking water to British troops in the station cleaned out and purified.

In regard to the sale of adulterated milk to the men, no steps have been taken in the matter, for the sole reason that no precautionary measure would be of the slightest avail save that of ordering the cows to be brought to the barracks for the purpose of being there milked, an arrangement which the cowkeepers would not submit to; besides, the quantity of milk used by the men is very small, as they only require sufficient for their tea. Morever, if the milk was to blame the disease would appear amongst the women and children, who consume large quantities of it, whereas the fact is, not one of them has been admitted with fever.

The disease has not been confined to any one barrack or group of buildings, nor limited to particular companies, but has attacked indiscriminately the men of the battalion, whether stationed at head-quarters or at the fort, with one notable exception. The married people are quartered in buildings erected within the last two years on the maidan away from the barracks, and, although the ground in the immediate vicinity of these buildings was, during the late wet weather, under water and swampy for several days, yet not a single case of fever occurred amongst the occupants, who use drinking water from the same wells which supply the men.

It is possible that the disease may have originated in the bazaars, as a number of the men stroll into the regimental and sudder bazaars every evening, and regale themselves on ginger pop and similar beverages, prepared from the unfiltered and generally filthy water of some bazaar wells, which, after heavy rain, become still more polluted, as they are in no way protected from surface water, &c.

On the 23rd August of the present year Surgeon-Major Murray reported the occurrence of seven cases of enteric fever in the Royal Artillery Division at Lucknow. Dr. Murray states:—"These seven cases occurred about the "same time, and I have delayed forwarding this report until the last case "under treatment had been discharged from hospital. Annexed is a detailed "statement of name, rank, age, service in India, date of admission, &c. of the "seven cases, five of which were men of G/A, Royal Horse Artillery, one a "woman of G/A, R.H.A., and one a gunner of G/5, R.A.

"These seven cases were all well marked cases of enteric fever, in none of "which, after the first few days, could there be any doubt as to their nature, "although at first admission the symptoms resembled very closely those of "ardent fever (febricula), which disease was at the time very prevalent in "G/A, R.H.A.; in all, diarrhœa, with tenderness in right iliac region, and "gurgling, accompanied by ochry motions, was well marked; in six out of "the seven cases successive crops of the characteristic pink spots, disappear-"ing on pressure, were observed on the thorax and abdomen. In the seventh "case (that of Mrs. T.), the body was covered with a copious eruption of "eczema solaris (prickly heat), whose presence obscured the eruption charac-"teristic of the disease, if indeed it was present. In two of the fatal cases "the lesions pathognomonic of the disease were well marked, and completely "confirmed the diagnosis arrived at during life. The third fatal case was "that of the woman, in which, at the desire of the husband, no post-mortem "examination was made.

"In the case of Gunner M. an unusual symptom presented itself in the "course of the disease; well marked 'trismus' set in on the 3rd of May, the "jaws being firmly closed; it continued a prominent symptom up to the "termination of the case in death, and post-mortem examination revealed "effusion of serum and milky opacity of membranes at base of brain in "neighbourhood of roots of the nerves. This series of seven cases would, I "think, have convinced the most sceptical, if indeed any remain to be con-"vinced, that true enteric fever is by no means an uncommon disease in "India, and often occurs in as typical a form as it is ever seen in the colder "climate of the British Isles. Cases are sometimes met with in which there "is much hesitation in deciding whether the remittent type or typhoid type "predominates, but in this series of cases there was no room for doubt. It "will be seen by reference to annexed table that the six cases occurring in "G/A, R.H.A., were pretty equally distributed in the different barracks of "that corps. The battery occupies three barracks for unmarried soldiers, and "one barrack or row of married quarters; from each of these one case at least "came, and from one of them, No. 4, two cases were admitted.

"The one case in G/5, R.A., whose lines adjoin those of the Royal Horse "Artillery, was admitted from No. 2 barracks. This is the only case that "occurred in that battery.

"At the time these cases occurred, cases of enteric fever were prevalent in "Her Majesty's 73rd Regiment, which had previously suffered severely from "an epidemic of this disease at Subathu, from which station it had recently "arrived. This regiment is quartered quite away from the Artillery lines. I "cannot find that there was any intimate association of the men of the two "corps, and there is no probable evidence that the outbreak in the Royal "Horse Artillery was in any way connected with these cases occurring in the "73rd Regiment.

"I have no proof or reason to believe that the disease arose from personal "communication with anyone suffering from enteric disease.

"The water supply for the barracks and married quarters of both batteries "is obtained from a large pucka well, to which a filter bed is attached; "an analysis of this water made last year showed that the water is of inferior "quality, and an analysis which I had again made, after the occurrence of "these cases, this year by the station analyst confirms the previous one, and "it appears from these that the quality of the water is little, if at all, im-"proved by filtration, although great attention has been paid to keeping the "filters in proper working order.

"No sanitary defects could be discovered in the latrines; the dry earth "system is thoroughly carried out; surface drainage is well attended to, "there is no subsoil drainage; the sanitary condition of the neighbourhood "is satisfactory.

"The regimental bazaar is well kept. The rations, food, and drinks "generally have been of good quality.

"In all the cases that have occurred, the men have been a short time in "the country, three of them five months only, four of them one year and "five months, and all were under 27 years of age."

Surgeon-Major Murray has since supplemented the preceding report by the following note:—

"A draft of 10 men joined G/A Royal Horse Artillery on 5th December 1877. Out of these, one man was attacked, gunner M., the case terminating fatally.

"The battery came from England in November 1876, and nearly all the men in it were very young soldiers.

"A draft of 10 men joined the field battery G/5 Royal Artillery on the 14th December, of these, one man, Gunner W., had enteric fever, and recovered.

"A draft of 81 men joined the 73rd Regiment from England on the 21st January 1878; of these, 6 have had enteric fever, 2 of the cases fatal.

"A draft of 93 men joined the 85th Regiment sometime between December 1877 and April 1878; of these four men were attacked by enteric fever.

"A draft of 60 men joined the 13th Hussars about December; none have been treated for enteric fever.

"About the well water as a cause, I myself am inclined to think that it has nothing to do with the fever, at first I was inclined to think it had, and thought it possible that the well might have been under repair, and other waters used for a longer time, so I wrote to the Public Works Department to give me the date, if possible, on which they took it over for repair, but apparently they keep no record, as they replied that they could not give the date, but have no doubt that it was *about* the end of April or the beginning of May, from the note made in the hospital diary. If so, it could not account for the cases in April, and could give a very short period of incubation for those in May.

"All the barracks get their water supply from the same filtering tank and well in the Royal Horse Artillery lines; those both of the Field Battery and Royal Horse Artillery Battery.

"In each barrack of the Royal Horse Artillery, as well as the married quarters of that corps, there was at least one case, but in the Field Battery one case occurred. In this battery the men are in large proportion old soldiers, the battery being one of the old Indian batteries, going home this cold season for the first time. The one case that was admitted from it was in a soldier arrived by the last draft.

"The milk supply is procured for the men and families from three or four milk-men living in the Royal Artillery bazaar; the milk is brought by them from cows milked at their houses—not at the ration stand. Some of the married families get their supply of milk from goats, which are brought up to the quarters and milked in their presence. As far as I can find out, only three or four of the families do this, the others preferring cows' milk from the bazaar. The same milkmen do not supply the 73rd Regiment so far as I can find out,; our bazaar is a mile from that of the 73rd who have a large bazaar of their own, so I do not think that the two corps can be supplied by the same men.

"Water for cooking purposes is drawn from the filter bed, or ought to be, but as some of the cook-houses are a considerable distance from the filter, it is quite possible, and I think probable, that the cooks in the distant ones use water brought from neighbouring wells. I have no evidence of this, and of course it is strictly forbidden, but natives cannot be depended on when out of sight of authority. I have not been able to discover any cause for these cases. During the first months of this year, there were in addition to the drafts arriving from England, several men attached temporarily to the two batteries en-route to join their own batteries. One of these men, who was attached to G/5 Royal Artillery about the time the first case occurred, joined his battery at Allahabad, and was shortly after attacked with enteric fever."

ROLL of CASES of ENTERIC FEVER in R.A. DIVISION, LUCKNOW, from 22nd April 1878 to 23rd August 1878.

Corps.	Rank.	Age (in Years).	Residence in India since last Landing.	Total Service (Years).	Disease for which originally admitted to Hospital.	Date of Admission.	Disease to which changed.	Date on which changed.	Date of Death.	Date of Recovery and Discharge.	State of Health prior to Admission.	Barracks from which admitted.
						1878.		1878.	1878.	1878.		
G.A., R.H.A.	Gunner W. B. -	23	$1\frac{5}{12}$	$5\frac{5}{12}$	Febricula -	April 22nd	Enteric fever -	May 4th -	- - -	June 11th	Good - - -	No. 4, R.H.A. Lines.
„ -	Gunner J. M. -	26	$\frac{5}{12}$	$1\frac{7}{12}$	„ -	April 24th	„ -	April 28th	May 7th -	- - -	Good - - -	No. 5, „
„ -	Driver J. C. - -	25	$1\frac{5}{12}$	$7\frac{5}{12}$	„ -	April 28th	„ -	May 4th -	May 9th -	- - -	Good - - -	No. 3, „
„ -	Gunner T. C. -	21	$1\frac{5}{12}$	$3\frac{5}{12}$	„ -	May 1st -	„ -	May 8th -	- - -	June 14th	Good - - -	No. 4, „
„ -	Mrs. T. (wife of Gunner T.)	30	$1\frac{5}{12}$	—	„ -	May 7th -	„ -	May 11th -	May 13th -	- - -	Delicate, had recently had small-pox.	Married Quarters, R.H.A. Lines.
„ -	Gunner J. B. -	22	$1\frac{5}{12}$	$3\frac{1}{12}$	S. C. fever -	May 17th -	„	May 18th -	- - -	Aug. 21st -	Good - - -	No. 3, R.H.A. Lines.
G. 5, R.A. -	Gunner W. W. -	26	$\frac{7}{12}$	$6\frac{5}{12}$	Febricula -	June 13th	„ -	June 19th	- - -	Aug. 23rd -	Delicate, had lately been under treatment for dysentery for 29 days.	No. 2, R.A. Lines.

RETURN showing the AGES of MEN attacked and died.

Ages.	Strength on 1st July 1877.	Typhoid Fever.				Deaths at each Age from all Causes except Accident or Violence.	Proportion of Deaths at each Age per 1,000 of Strength from all Causes except Accident or Violence.	The relative Per-centage of Deaths from Typhoid Fever and those from all Causes except Accident or Violence.
		Cases.	Deaths.	Rate per 1,000. Cases.	Rate per 1,000. Deaths.			
22 years and under	4,013	52	15	12·97	3·73	32	7·97	46·87
23 to 24 years -	4,713	30	11*	6·36	2·33	37	7·85	29·72
24 to 26 „ -	5,899	29	13	4·91	2·20	52	8·81	25·00
26 to 28 „ -	5,882	10	4	1·70	0·68	40	6·80	10·00
28 to 30 „ -	4,718	5	2	1·05	0·42	51	10·80	3·92
30 to 35 „ -	5,618	6†	5‡	1·06	0·88	61	10·85	8·19
35 to 40 „ -	4,381	3	3	0·68	0·68	65	14·83	4·61
Over 40 years -	1,132	1	—	0·88	—	29	25·61	—
Total -	—	136	53	—	—	367		

* Includes one admission of 1876. † One case died in 1878.
‡ Includes one admission of 1876.

YEARS of SERVICE in INDIA of the CASES and DEATHS from ENTERIC FEVER.

Period of Residence in India since Date of last Landing.	Strength on 1st July 1877.	Cases.	Deaths.	Proportion per 1,000 of Enteric Fever. Cases.	Proportion per 1,000 of Enteric Fever. Deaths.	Deaths from all Causes except Accident or Violence.	Proportion of Deaths at each Period of Service from all Causes except Accident or Violence per 1,000.	Per-centage of Deaths from Enteric Fever to Deaths from all Causes except Accident or Violence, at each Period of Service.
1 year and under	4,735	61	19*	12·88	4·01	67	14·14	28·35
2 years „ -	3,730	21	12	5·63	3·21	49	13·13	24·48
3 „ „ -	3,748	8	3	2·13	0·80	27	7·19	11·11
4 „ „ -	5,341	27	8	5·05	1·49	47	8·79	17·02
5 „ „ -	2,827	1	1	0·35	0·35	17	6·01	5·88
6 „ „ -	2,612	6	4	2·29	1·53	21	8·03	19·04
7 „ „ -	3,146	4	2	1·27	0·63	32	10·17	6·25
8 „ „ -	2,089	5	4	2·39	1·91	19	9·09	21·05
9 „ „ -	2,039	1†	—	0·49	—	19	9·31	—
10 „ „ -	2,407	1	—	0·41	—	16	6·64	—
Over 10 years -	3,682	1	—	0·27	—	53	14·39	—
Total -	—	136	53	—	—	367		

* Includes two admissions of 1876. † Died in 1878.

MONTHS of the YEAR in which CASES and DEATHS occurred.

Months.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Cases -	5	3	5	13	23	11	17	9	26	3	7	14*	136*
Deaths -	3†	2†	3	5	10	3	5	8	5	2	3	4	53‡

* One died in 1878. † One admission of 1876.
‡ Two admissions of 1876.

CASES and DEATHS among OFFICERS, WOMEN, and CHILDREN.

1877.	Strength.	Cases.	Deaths.	Ratio per 1,000 of Strength to	
				Cases.	Deaths.
Officers - - - -	1,346	12	4*	8·91	2·97
Women - - - -	3,215	11†	5	3·42	1·55
Children - - - -	6,375	2	—	0·31	—

* One admission of 1876. † One died in 1878.

CASES and DEATHS distributed in the several DIVISIONS and DISTRICTS of the BENGAL COMMAND.

Division or District.	Allahabad.	Oudh.	Rohilcund.	Saugor.	Gwalior.	Meerut.	Sirhind.	Lahore.	Rawal Pindi.	Peshawar.	Total.
Cases - - -	4	8	8	7	3	32	46*	10	10	8	136*
Deaths - - -	2	4†	4	3	4†	12	12	6	3	3	53‡

* One died in 1878. † One admission of 1876.
‡ Two admissions of 1876.

DISTRIBUTION of ENTERIC FEVER among the various ARMS of the SERVICE.

Corps.	Average Annual Strength.	Cases.	Deaths.	Ratio per 1,000 of Strength to	
				Cases.	Deaths.
Cavalry - - - -	2,552	4	1	1·56	0·39
Royal Horse Artillery - -	1,744	20	7	11·46	4·01
Royal Artillery (Field and Garrison).	4,798	14	8*	2·91	1·66
Infantry (including Royal Engineers.)	27,572	98†	37‡	3·56	1·34

* One admission of 1876. † One died in 1878.
‡ One admission of 1876.

STATEMENT showing the CASES of ENTERIC FEVER which occurred in the BENGAL COMMAND during 1877, classified according to Periods of Indian Service, under each Age severally, from 22 Years and under, to 45 Years, and showing respectively those that recovered and those that died under each head.

Age.	Periods of Indian Service.																				Cases under each Age.		Total Admissions.
	1 Year and under.		2 Years and under.		3 Years and under.		4 Years and under.		5 Years and under.		6 Years and under.		7 Years and under.		8 Years and under.		9 Years and under.		10 Years and under.		11 Years and under.				
	Recovered.	Died.	Recovered.	Died.	Recovered.	Died.	Recovered.	Died.	Recovered.	Died.	Recovered.	Died.	Recovered.	Died.	Recovered.	Died.	Recovered.	Died.	Recovered.	Died.	Recovered.	Died.	Recovered.	Died.	
22 Years and under	28	9	5	6	1	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	37	15	52
23 years	6	2	1	1'	1	—	1	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9	6	15
24 „	5	*3	1	2	1	—	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11	*5	15
25 „	3	1	2	2	—	—	3	2	—	—	1	—	—	1	—	—	—	—	—	—	—	—	9	6	15
26 „	1	—	—	1	1	2	3	1	—	—	1	3	1	—	—	—	—	—	—	—	—	—	7	7	14
27 „	—	—	—	—	1	—	2	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	4	—	4
28 „	1	2	—	—	—	—	1	—	—	—	—	1	—	—	—	1	—	—	—	—	—	—	2	4	6
29 „	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	1	—	—	1	—	—	—	3	1	4
30 „	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
31 „	—	—	—	—	—	—	—	2	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	3	3
32 „	—	†1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	†1	1
34 „	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	1
35 „	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	‡1	—	—	—	—	1	‡1	2
36 „	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
37 „	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	1
39 „	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
45 „	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	1
Cases by periods of Indian Service. Total	44	*19	9	12	5	3	19	8	—	1	2	4	2	2	1	4	—	‡1	1	—	1	—	84	§54	—
	61		21		8		27		1		6		4		5		1		1		1		—	—	133

* One admission of 1876. † Admission of 1876. ‡ Died in 1878. § Includes 2 admissions of 1876 and 1 death of 1878.

APPENDIX No. XII.

CHOLERA, ITS NATURAL LAWS AND PROGRESS.

By Surgeon-Major J. A. MARSTON, Secretary to the Surgeon-General.

(EXTRACT from SURGEON-GENERAL'S, BRITISH FORCES, ANNUAL REPORT for 1878.)

IN approaching a subject like that of cholera, the literature is so extensive, the number of views so many and conflicting, and even mutually destructive, that there is no branch of epidemiology to which the same amount of labour and observation has been bestowed with so little apparent advance.

That this is so is patent to every one, and little short of a reproach to epidemiologists themselves; indeed, so well is this fact recognised, that the majority of people no sooner encounter the word cholera in a report than, taught by previous experience, they regard any information as to the laws of its causation and progress as made up of barren hypotheses. Beyond a bare recital of facts—numbers and dates—the study of cholera has come to be regarded as a hopeless pursuit, to be relegated, like certain branches of metaphysics, to the category of "the unknowable." Now, without going into needless detail, much of this unfruitful confusion may be attributed to one or other of the following causes:—

I.—The observation of the disease as it appears, or seems to appear, from the European and Indian stand-points respectively, and the way in which each view is pressed so as to exclude the possibility of the other being tenable.

II.—The very different, and necessarily different, impressions received by the local observer, whose power can only extend to tracing on the smallest scale the progressive steps of a disease, and by those who enjoy the opportunity of surveying all the facts extending over a continent from one central office (at any rate as regards numbers and dates of attack), and of comparing the observations of one epidemic with those of another. Supposing the latter to discover a harmonious relation of one epidemic to another, of one, and that a small outbreak to an epidemic, or of one isolated case even, to a sequence of events from which such case has been separated by an interval of time, but to which sequence of events it has borne a certain and apparently definite, because repeated relation, then he cannot avoid a conclusion, although reached by an empirical deduction from occurrences in relation to season and locality, which has to him the force of a primary law. On the other hand, the lessons derived by the local observer are the necessary complement and supplement of the former; and, although these may occupy only a secondary and subordinate position to the former, they will possess this practical advantage, that, if true, they can be made use of to influence the incidence or abort the extension of the disease.

III.—Lastly, the assumption of some hypothesis, theory, or doctrine in the first place, and the insensible influence which this exerts in systematising the facts so as to harmonise with the assumption.

Dr. Bryden's Views.

The only observer, so far as I am aware, who has had unrivalled opportunities of studying cholera as it appears in India from the first position—that of the medical statist and epidemiologist, not of the local observer—has put forward certain views, which he professes to be his reading of the facts them-

selves,—to be the outcome, that is, of a cholera history open to the observation of any one as written, so to speak, by cholera itself and chronicled merely by him,—on which he has attempted, by his faith in the truthfulness of the record, to make certain forecasts of events, and to declare that every fact, however apparently insignificant, in regard to cholera does not occupy an isolated or accidental position, but a definite relation to all the other facts, past and future; which, in brief, occupies its place in relation to the whole, much as a trifling but necessary piece of machinery does to the whole engine, and sometimes, if regarded aright, may even be said to be the necessary forerunner and clue to the mutual relation of those events one to another, the totality of which makes up an epidemic.

It appears to me that views which represent to be the outcome of hard official and therefore responsible work, extending over a long series of years and consecutive epidemics, merit, indeed demand, a thoroughly impartial as well as severely critical examination; and as Dr. Bryden's works, from the intrinsically difficult nature of the subject when regarded as a branch of natural history, must necessarily be elaborate, I have attempted in the following remarks to indicate, in the interest of the public service—for the matter is one which has a more direct practical bearing on army hygiène and public health than is commonly imagined—as succinctly and clearly as I can the views which Dr. Bryden has for the past 15 years persistently put forward; at first tentatively, but year by year with the increasing vigour of a more matured conviction.

The first striking fact in the history of cholera is that, whilst certain areas enjoy a complete or comparative immunity from cholera, others stand endemically and perennially, or epidemically and periodically, related to it; in illustration, we have the area comprised in Bengal proper as an endemic and perennial, and that comprehended in the North-Western Provinces, Punjab, and Oudh as the periodical or epidemic areas of cholera. Here, then, is a very plain geographical division: on the one side, a permanent occupation of an area by cholera, fluctuating in the character and intensity of its manifestations, but still permanent; on the other, an area where cholera is a periodical, but never a permanent occupant. And further, the period (season) at which the manifestation of cholera is at its minimum in the one locality it is at its maximum in the other; and this contrast in regard to cholera is rendered more significant by another and striking phenomenon, viz., that the meteorological conditions prevailing in one or other area are in some respects assimilated at the time of the maximum prevalence of cholera in each respectively. These two areas stand to one another in this position—that one may be regarded as the permanent manufactory of that cholera cause which is periodically to overflow and occupy the other. The endemic area—the manufactory—is a flat diluvium on the seaboard, but little raised above the sea level; the epidemic area is laterite, kunkur, or other formation, of varying level from the plains to the Himalayas.

Dr. Bryden declares that cholera has a definite and demonstrable geographical position; that, during any given year, it manifests itself in a succession of outbreaks interrupted by periods or seasons of dormancy; that, in its epidemic and invading form it re-appears throughout a succession of years, the period from its first invasion to its final departure, decay, or death, by whatever term we may express the fact sought to be impressed, representing the normal life-history, as it were, of an epidemic, each one of which is but a repetition of its predecessors, the parallels between different epidemics being conterminous with, and as fixed and stable as is the recurrence of the meteorological conditions in the area invaded.

The prevailing winds at certain seasons carry the disease over the endemic basin and across the continent, or up the Gangetic or Bramapootra valleys, its natural outlets.

The first general fall of the rains extinguishes the disease in the endemic area, but fits every other province lying within monsoon influence for the invasion—or development, if the cholera cause has been already distributed—of the epidemic.

The cholera cause, miasm, or be it what it may, emanating from the endemic area, covers within a limited time one, more, or all of what may be termed the natural provinces; that is, a cholera epidemic does not at once spread over the country, but occupies successive areas, usually occupying a new province vacant by the death of the last epidemic and destined to continue for the period normal to it. The cholera cause, having no locomotive power in and by itself, must depend for its movement on a vehicle and an extraneous force, the vehicle being moisture, the force being the wind; that is the assumption. Be this as it may, the movement out of the endemic area manifests itself indubitably by a greatly increased cholera death-rate among the population inhabiting the contiguous country; the registration of deaths stamps the fact of its presence and movement. But—and this hypothesis supplies an important connecting consideration in studying an epidemic as contra-distinguished from an outbreak—the cholera cause may invade and be present in a vast tract of country without any manifestatiou of its existence there; 1st, because there may be no population on which it can manifest itself; or 2nd, the conditions (to wit, season) necessary to such manifestation may be absent; in other words, its distribution in space is one thing, the manifestations of its seasonal activity on human beings another. And it is clear that the time of its distribution may be separated from that of its activity or manifestation; this hypothesis rests on an accumulation of observations allied to the following:—

1st. That a marching body of men has at a certain season crossed a river or tract of country and been suddenly "struck" with cholera without any assignable or recognised cause.

2nd. That the cholera cause having overpassed or transgressed the endemic area, as evidenced by the increased cholera death rate outside such area, its distribution over another area will be rendered manifest by numerous sporadic cases, which experience has proved to stand in some definite relation to the occurrences, viz., the epidemic which is to follow in due season.

On the other hand, cholera in its relation to an outbreak concerns human beings exclusively; the incidence of the disease as regards an individual or body of individuals may depend on many things (including infection); but outbreaks do not radiate in all directions as human beings do, but only in a definite direction, viz., the direction which the epidemic is taking; and no series of outbreaks stand in such casual relation to one another as to make up an epidemic. And here I would remark, though somewhat at the risk of interrupting by an illustration the simple sequence of an explanatory statement, that cholera in India neither radiates nor retrogrades. It is far from being the fact that any given outbreak has ever stood in the relation of the focus or centre of an epidemic in the same figurative way, as has been represented, that a stone thrown into the middle of a still lake stands to the series of widening circles caused by its disturbance of the water. In the year preceding (1878) the last Hurdwar outbreak, for example, Dr. Bryden discussed in writing the probable events of 1879 in regard to cholera, pointing out the reasons for his belief that such an outbreak would occur, and the probable date of its occurrence, and discussed with the writer the probable course of the epidemic which he feared was imminent, and the probable position, real and apparent, which the Hurdwar outbreak would occupy in the history of the events when this came to be written. Considering the complex nature of the subject, and the relations and dependent position which cholera, as an epidemic, has to natural (meteorological) phenomena, all forecasts must necessarily be subject to certain conditions; still, the conditions were clearly stated, and the forecast was sufficiently accurate to preclude the possibility of its having been other than the result of reasoning upon past observations. This subject will be more fully touched upon hereafter; but it is necessary to remark here that Dr. Bryden nowhere denies the truth or accuracy of European observations, nor the manifestations of contagious or infectious properties in this disease. What he does emphatically deny is, that the measure of European observations or deductions is applicable to cholera in this country, or that, assuming the existence of such infectious properties, they are capable of explaining more than an insignificant part of the history of epidemic cholera as witnessed here. Of course, persons contracting cholera, as at Hurdwar, may carry it with them, sicken and die of it for a given period after their

dispersal; nay, they may even impart the disease to those with whom they come in contact, without in any way annulling the force of all the other and larger assemblage of facts which go to prove that cholera-stricken pilgrims may be introduced into numerous districts and populations in a given direction without giving rise to any outbreak at all, or to anything approaching an epidemic; and what is quite as strong, if not more so, where they do apparently cause an outbreak on a limited scale, the prevalence of the disease soon ceases; introduced at as many points and as frequently as it must have been by these pilgrims, it spread only in those directions where it was due to spread, and no other. The reasons for assuming that it did not spread in those other directions by human intercourse, but that the sequence of events would in all probability have been such as it was if no Hurdwar fair had taken place at all, must be discussed hereafter. Conceding, as we must do, that we can trace with certainty the progress of cholera by its death rate, and that in this way we can readily perceive where it stops, and allowing that its advance as an epidemic will depend upon the continuance or not of favouring conditions, such as season, it may be urged that its limitation to any given provincial area is susceptible of another explanation than that given by Dr. Bryden, who says that such limitation is a natural law. All infectious diseases have their years of epidemic prevalence and their seasons, in an epidemic year, for attaining a maximum and minimum of prevalence; hence it might be said that if the spread of cholera be attributable to infection, this influence may become nugatory or abortive in the absence of other concurring causes—to wit, in the case of cholera, heat and moisture—but when these re-appear in their season, a previously dormant infection becomes free to act again; the dormant cholera germ becomes the active cholera germ, but all the while depending, nevertheless, for its development and increase on human beings and human intercourse.

Against this view are the following facts: The marked regularity, almost to a day, of the re-appearance of cholera; its almost simultaneous occurrence over a large tract of country, and its frequent non-appearance in an area contiguous to an infected one, human intercourse freely taking place between both (infected and non-infected).

Put in their shortest form, and divested of all figurative language, the force of which could not be fully appreciated outside India, such as that cholera is typified in plant life, &c., Dr. Bryden's views may be epitomised thus: Cholera is ever-present or endemic in Lower Bengal, and may be diffused or become epidemic any year.

When it travels to the north-west the invasion is frequently confined to a natural area limited by the line of 80° east longitude.

It never appears in Northern India before the 20th April in any year.

Individual cases west of the line of 80°, especially in the last quarter of the year, very constantly precede the appearance of cholera in the following spring.

If the Upper Provinces be affected as an area, cholera will last until the third week of September.

Experience teaches that a bad cholera in spring is followed by a worse during the monsoon, usually appearing a fortnight after the beginning of the rains. Cholera, epidemic in the east of India, may be entirely diverted from the North-west into Western India. This takes place during the prevalence of the north-east monsoon, in the last quarter of the year.

Cholera of 1877-78-79.

The year 1878, as regards cholera, compares very unfavourably with the previous one. In 1877 there were but 18 cases and 14 deaths among Europeans in the Bengal Presidency, while in 1878 there were 268 cases and 186 deaths.

The stations attacked were chiefly Lucknow, Fyzabad, Saugor, Morar, and Agra, in all of which the disease appeared in an epidemic form.

In Lucknow there were 23 attacks and 15 deaths; at Fyzabad 109 cases with 75 deaths; at Morar and Gwalior 73 cases and 47 deaths; and at Agra 14 cases and 10 deaths.

Agra was the geographical limit to the north, with the exception of one fatal case in E-A Royal Horse Artillery when on the march from Umballa to Meean Meer (on the 14th October), and this latter case is all the more remarkable as it seemed to be the precursor of the body of cholera which has appeared in so fatal a form this year (1879) in the Punjab.

In the postscript to Dr. Bryden's report on cholera for 1876, page 215, there are some remarkable facts noted which, when read by the light of past epidemics, appear to have foreshadowed the events of 1878.

In October 1877 "Agra, Muttra, and Gwalior were simultaneously affected;" and these cases, and others in Western India, Dr. Bryden considers the "indices" premonitory of the outbreak in the following spring (subsequent to 20th of April) in these places. "On the 2nd and 3rd of May a mother and "child died in the fort at Agra, and on the same day cholera was reported at "Gwalior." "In 1869 cholera broke out virulently on 22nd April. In this "year the first case appeared on 7th May."

A native treasure escort also was attacked on the road between Agra and Gwalior on the 1st May, and out of 379 men, 113 were attacked, and 55 died.

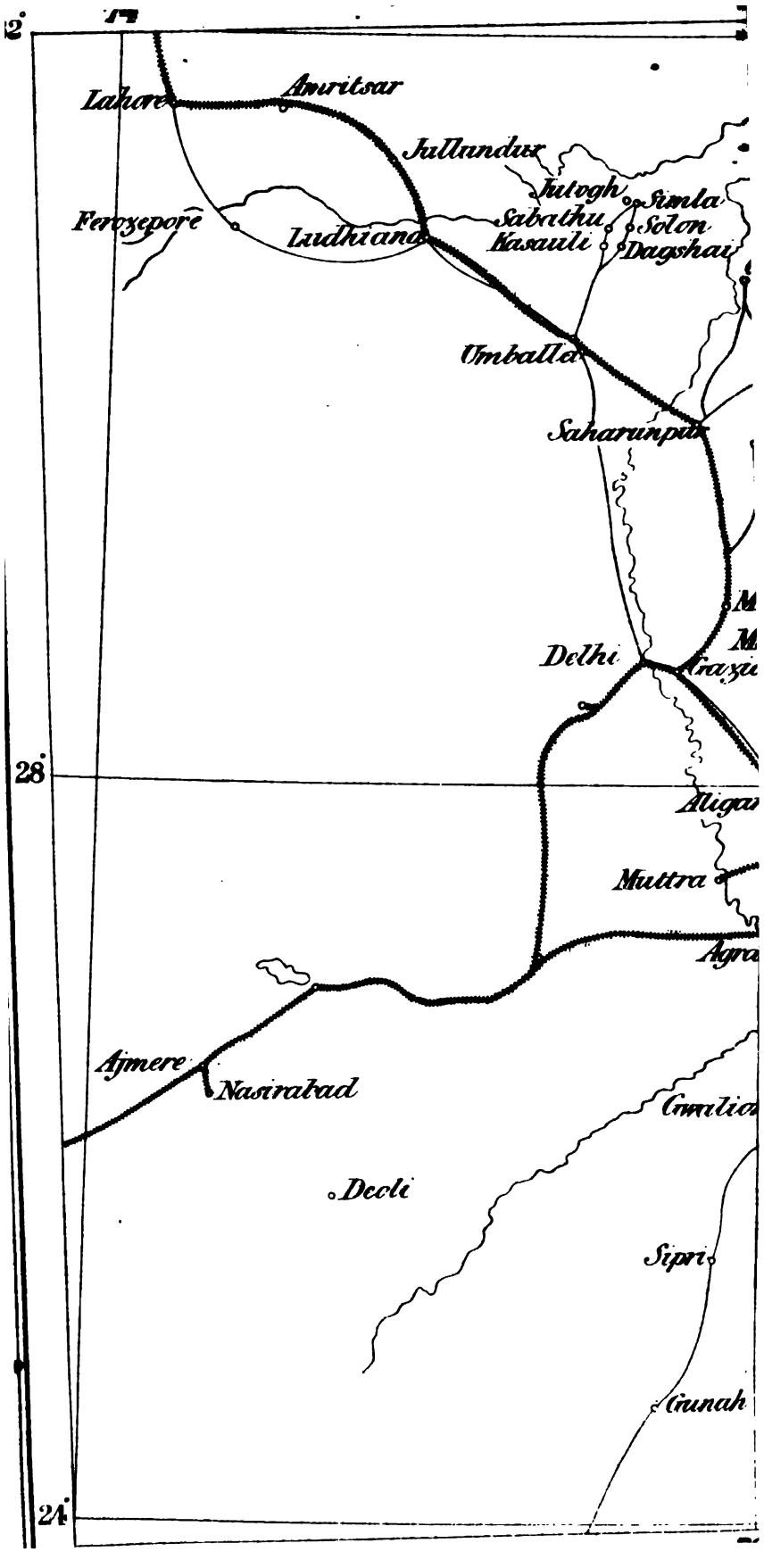
This cholera at Agra, Morar, and Gwalior is, according to Dr. Bryden's views, a revitalisation of the cholera that had passed across (been distributed) India from east to west in the last quarter of 1877, and the cases which occurred in the end of that year foreshadowed the severe epidemic that appeared in the following spring. The outbreak that took place in the autumn of 1878 was probably the movement of a new epidemic which emanated from the endemic basin (Bengal proper) early in the monsoon season of the same year. About the 20th July cholera broke out in the Hazaribagh jail in Chota Nagpore. A case occurred at Dinapore in the 65th Regiment on the 9th July, two cases at Chunar on the 9th and 24th August, one at Benares on the 15th August, and at Allahabad on the 9th, 17th, and 24th August; and, during August and September, the severe outbreak in M-5th Royal Artillery and the 1-25th Foot occurred at Fyzabad, and, ten days previous to the latter outbreak, a case had occurred in the station giving an indication of the presence of the disease.

This body of cholera spread rapidly, extending as far as Kumaon and Gurhwal in the Himalayas, Bijnore in North-Western Provinces; Puttiala and Delhi suffered in the last week of September and first of October, and the case already alluded to in the battery marching from Umballa to Meean Meer seemed to be an indication of the advance of the same epidemic to the Punjab, foreshadowing what has happened in Northern India, the Himalayan districts of Kumaon and Gurhwal, and the great outbreak at the Hurdwar fair in 1879.

In brief, the history of the present epidemic may be read thus:—An overflow from the endemic cholera area took place about July, and cholera, appearing first at Hazaribagh, advanced rapidly, appearing almost simultaneously at all the stations of Oudh and the Gangetic Provinces between the 10th and 16th August, culminating (as far as European troops were concerned) in the outbreaks at Fyzabad and Lucknow. The cases that appeared in the Himalayan tracts before alluded to were indications of the terrible outbreak that took place in the spring of 1879, and of that at the great Hurdwar fair.

Dying away after the rains, indications still appeared in the commencement of the cold weather of its existence in the area affected in August and September; and the epidemic that has lately appeared in the Punjab and Afghanistan is apparently the result of the advance that took place early in 1878 and travelled northward as already traced.

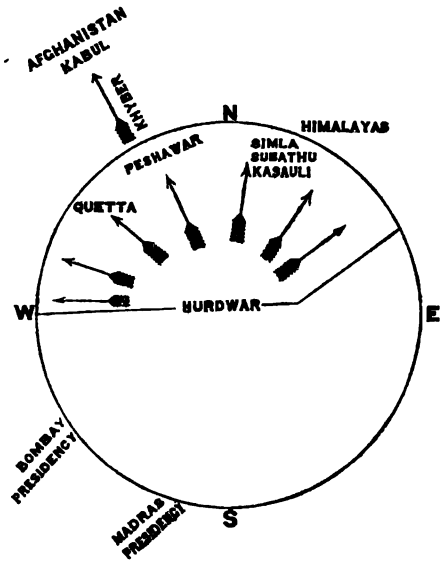
The foregoing very briefly embodies the views entertained by Dr. Bryden in regard to the movement of this epidemic. As stated after the events to which they relate they lose much of their force, but, when viewed in the light of the fact that it was in the winter of 1878–79 that Dr. Bryden, first in writing, and subsequently orally, stated the probable relation of apparently insignificant events as they occurred to other and larger ones which have since happened, they carry with them a considerable weight to those acquainted with these facts,


Lahore
Amritsar
Jullundur
Jutogh
Simla
Sabathu
Solon
Kasauli
Dagshai
Ferozepore
Ludhiana
Umballa
Saharunpur
Delhi
Aligar
Muttra
Agra
Ajmere
Nasiratad
Deoli
Sipri
Gunah
28°
24°

cially when studied in connexion with the material on which he has worked
5 years, viz., the registration-statistics that have already accumulated and
till coming in from all districts of India from local and independent sources,
borating one another in a way unknown at the time to those who furnish
; and, where so unmistakeable a disease as epidemic cholera is concerned,
broad results cannot be vitiated by trifling inaccuracies.

he theory of "infection" or "contagion" would be utterly inadequate to
unt for the regularity in the appearance of cholera in a long series of suc-
ive epidemics, or the simultaneous nature of the outbreak in so many places,
ost on the same day. Looking on Hurdwar as a centre, there is no doubt
the pilgrims who attended the fair proceeded to it from every point of the
pass, and if the theory of "infection" were true, then cholera should have
owed in their tracks in an equal number of directions, when these same
grims radiated outwards to their various homes. This, however, was not by
means the case, for, while cholera appeared in a severe and fatal form in
Himalayan tracts to the north and in the Punjab, the country to the south
east has remained free from epidemic cholera.

The following diagram which must be read in connexion with the figures in
following table (page 306), roughly indicates the movement of the epidemic
1879 to the North-west, Hurdwar taken as the assumed centre of a circle.
e arrows indicate the direction of the epidemic :—



In illustration of the events antecedent to and following this Hurdwar
utbreak, the accompanying map, diagram, and table are appended.

The first (map) shows cholera as affecting the troops in August 1878,
pparently indicative of a wide distribution, and manifesting itself from 8th to
0th August.

The diagram shows the relative position and date of cholera outbreaks to that
of Hurdwar and preceding it.

And the table shows the very insignificant effect which the radiation of the
cholera-stricken pilgrims had on the country and districts in the immediate
vicinity of Hurdwar as far as the *epidemic*, which had already manifested itself
in the preceding year at Kumaon and Gurhwal, is concerned.

DIAGRAM of INDICES beyond the line of 80° east longitude in the last months of 1878 and spring of 1879, which suggested to Dr. Bryden that the area in Northern India, free from cholera from the end of 1876, had been already covered by a new and invading cholera, which should, according to past observation, manifest itself after the 20th April.

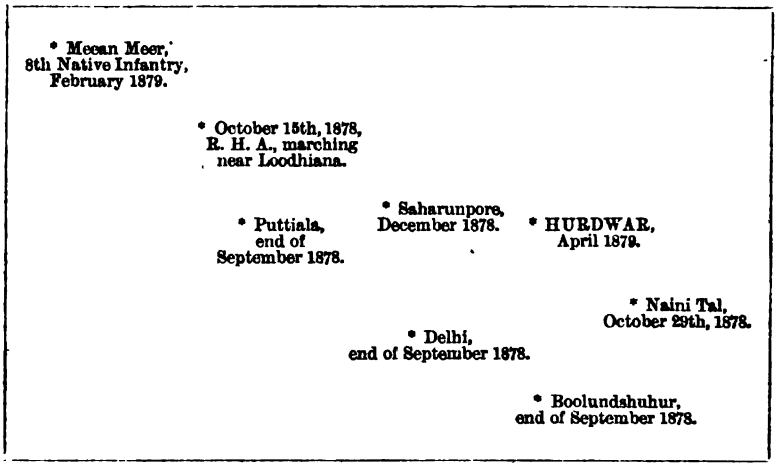


TABLE showing the insignificant effect which the radiation of the cholera-stricken pilgrims had on the districts immediately contiguous to Hurdwar (the scene of the pilgrim assemblage and encampment). Kumaon and Gurhwal being districts in which cholera had manifested itself (in 1878) are tabulated separately.

——	August 1878.	September.	October.	November.	December.	January 1879.	February.	March.
Kumaon and Gurhwal	8	134	66	132	211	32	19	21

Districts of North-Western Provinces, Oudh and Punjab: Population 60,000,000.	April.				May.				June.				July.			
	1st week.	2nd week.	3rd week.	4th week.	1st week.	2nd week.	3rd week.	4th week.	1st week.	2nd week.	3rd week.	4th week.	1st week.	2nd week.	3rd week.	4th week.
Kumaon and Gurhwal.	42	46	385	689	680	737	1,266	1,092	445	539	435	427	49*	213	—	—
Terai - -	—	—	11	61	17	20	30	13	17	11	3	2	1	1	—	—
Saharunpor - -	—	55	338	195	44	21	22	3	—	—	—	—	—	—	—	—
Muzaffarnagar -	—	21	151	60	52	35	6	2	1	—	—	—	—	—	—	—
Bijnore - -	—	—	172	305	37	10	4	—	—	—	—	—	—	—	—	—
Dehra - -	—	6	78	60	—	—	—	—	—	—	—	—	—	—	—	—
Moradabad - -	—	—	62	37	10	—	—	—	—	—	—	—	—	—	—	—
Bareilly - -	—	—	4	3	2	13	9	14	—	—	—	—	—	—	—	—
Fatehgarh - -	—	—	—	1	2	—	—	—	—	1	—	—	—	—	—	—
Shahjahanpore -	—	—	—	—	—	—	—	—	1	3	—	13	7	9	—	—
Cawnpore - -	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
Oudh as a Province	1	5	43	28	18	24	13	17	20	104	149	112	27	12	—	†

* Perhaps incomplete. † Non-epidemic season.

Withdrawal of Khyber Column.

As an example of practical action of a responsible kind being based upon a belief that, by an observation of the advent of cholera and the indices of its advance, it is possible to predict its probable appearance in a given area at a certain date, the return march of the troops from Afghanistan may be cited. As the result of reasoning, based mainly on data furnished by Dr. Bryden, it was determined to recommend the withdrawal of the troops.

The time was May; cholera was present in the Khyber route and Peshawar Valley; it was extending to the north, and, with much probability, even threatening Kabul at a later date. If the troops marched to India, they marched into cholera; if they remained, it advanced to them. But assuming that they remained, it would be necessary for them to continue at their posts until October; for past experience has sufficiently shown that cholera, when once it has invaded the Peshawar Valley, may be expected, speaking broadly as the result of past epidemics, to localise itself there from May to November, and in addition to the augmentation of sickness from other and ordinary causes, such as fever, both malarial and enteric, and dysentary, there was the prospect, if not the absolute certainty, of the troops having to incur such additional risk from heat-apoplexy in July and August as to make the return march at that time one of extreme peril. For it must be remarked that the liability to, and mortality from, heat-apoplexy in the Punjab, the portion of the country nearest Afghanistan about which we had any accurate data, increases at the end of June, doubles in July, and remains in full activity in August and September.

Reasoning from the data for a corresponding period of the year under nearly parallel circumstances in 1857, when the military necessity was imperative and many of the troops descended in May from hill stations into areas in the plains already infected with cholera, the result was a heavy mortality in most of the corps so circumstanced. But, however much the mortality may have varied in different corps, the continuance of that disease in a body of marching men was usually limited to eight days. The disease may, in fact, be said to culminate in the first four days after the corps has been attacked in community.

Reviewing these circumstances as a whole, and confronting the fact that the troops must run the gauntlet of cholera-stricken localities, the risk appeared unavoidable; and the intelligence subsequently received of the violent outbreak of epidemic cholera at Kabul in July, as well as the increasing sickness and mortality at the stations occupied by the European troops, especially in the 2nd Division, abundantly ratified the wisdom of the action taken by Government.

Re-commencement of War.

It may be well to add here that the subsequent re-commencement of the war (September 1879), and the march of General Roberts' force on Kabul, together with that of the field force through the Khyber under General Bright from Peshawar, partook somewhat of the nature of an experiment in regard to this persistence of cholera beyond the Indus: for, while cholera may be said to have altogether ceased in India generally by the middle of September, we find it unfortunately still prevailing (October 24th) in the Khyber and Kuram routes as far as Kabul itself. There were cases reported at Peshawar on October 16th, Lnndi Kotal, October 17th; at Kabul on 15th and 16th October; at Thull, on 20th October; Kuram, 8th October; and at Futtiahbad on 20th and 21st October.

Illustrations of Dr. Bryden's Positions.

It would extend this paper altogether beyond reasonable limits to furnish illustrations of the positions maintained by Dr. Bryden: but it is highly important that some of them should be represented, because, apart from all hypothesis, they claim to be grounded on fact and to represent natural laws; they tell their own tale, and, like all stories worth telling, their moral lies on the surface.

Of the movement (outspread) of the cholera cause from the endemic area as an antecedent of an epidemic, there is no need to dwell further than to refer to the maps and tables in Dr. Bryden's series of reports for illustrations.

That cholera invades in successive leaps, and that the manifestations of its advance are regular and self-limited, that epidemic cholera has, in fact, a special geography of its own, may be illustrated by the following. The line 80° east longitude, for example, may be taken as one such natural limit, and that of Jhelum (say 74° east longitude) as another :—

CHOLERA DEATHS in 1877 of the general population of Oudh and all the northern districts of the North-Western Provinces, to show, in continuation of past experience, how epidemic influences coming from the east are naturally limited by the line of 80° east longitude.

North-Western Provinces in the East up to the Line of 80°.			North-Western Provinces and Punjab West of 80°.		
——	Population.	Cholera deaths of 1877.	——	Population.	Cholera deaths of 1877.
Gorakhpur	2,019,350	4,448	Budaon	934,348	22
Basti	1,472,994	5,296	Bareilly	1,506,801	33
Fyzabad	1,094,390	2,503	Moradabad	1,122,131	18
Gonda	1,248,125	4,860	Bijnore	737,152	7
Bahraich	828,647	2,188	Dehra	115,711	None.
Sitapur	997,395	1,396	Futtehgarh	918,748	15
Kheri	791,032	709	Etah	703,485	12
Hurdoi (on the line of 80°).	996,523	5	Shahjahanpore	949,471	2
			Meerut	1,273,914	9
			Saharunpore	883,782	3
			Mozuffurnuggur	690,083	2
			Punjab (whole Province).	—	29

The GEOGRAPHY of the CHOLERA of the GENERAL POPULATION of the PUNJAB in 1875 and 1876, contrasted, illustratrating the limitation of the progress of Cholera at the longitude of Jhelum, say 74° east longitude :—

DISTRICTS.	Cholera Deaths of 1875.												Total deaths.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
Gurgaon	—	—	—	—	1	49	116	189	162	9	—	—	526
Delhi	1	—	—	—	12	29	70	51	106	10	8	—	287
Rohtak	1	—	—	—	17	72	130	6	1	3	9	—	239
Hissar	—	—	—	1	4	—	4	49	16	67	1	—	142
Sirsa	—	—	—	—	—	3	12	10	1	—	—	—	26
Karnal	—	—	—	—	—	—	25	12	32	3	—	—	72
Umballa	—	1	—	3	2	109	99	64	60	11	—	—	349
Simla	—	—	—	—	—	4	127	27	—	—	—	—	158
Ludhiana	—	—	1	1	—	—	30	31	20	—	—	—	83
Ferozepore	—	—	—	—	—	—	—	—	—	—	1	—	1
Montgomery	—	—	—	—	—	—	—	1	—	1	—	—	2
Mooltan	—	—	—	—	—	—	1	—	—	—	—	—	1
Muzaffargarh	—	—	—	—	—	—	—	—	—	—	—	—	—
Jhang	—	—	—	—	—	—	—	—	—	—	—	—	—
Dera Ghazi Kahn	—	—	—	—	1	—	—	—	—	—	—	—	1
Jullundur	—	—	—	—	1	—	11	12	32	7	—	—	63
Hoshiarpur	—	—	2	—	—	—	5	34	97	98	—	—	236
Kangra	—	2	—	1	1	11	122	238	197	81	7	—	710
Gurdaspur	1	—	—	—	—	1	225	557	613	85	—	—	1,482
Amritsar	—	—	—	—	—	1	28	504	583	149	3	1	1,269
Lahore	—	—	1	1	1	1	1	12	177	82	12	—	288
Sialkot	1	—	—	—	—	—	—	—	74	216	3	—	294
Gujranwalla	—	—	—	1	—	—	—	—	—	8	—	—	9
Gujrat	—	—	—	1	—	—	—	—	1	—	—	—	2
Shahpur	—	—	—	—	—	—	—	—	—	—	—	—	—
Jhelum	—	—	—	—	1	—	—	—	—	—	—	—	1
Rawalpindi	—	—	—	—	—	1	—	—	—	—	—	—	1
Hazara	—	—	—	—	—	—	—	—	—	—	—	—	—
Peshawar	—	1	—	—	—	—	1	—	—	—	—	—	2
Kohat	—	—	—	—	—	—	—	—	—	—	—	—	—
Bannu	—	—	—	—	—	—	—	—	—	—	—	—	—
Dera Ismail Khan	—	—	—	—	1	—	—	—	1	—	—	—	2

continued.

Districts.	Cholera Deaths of 1876.												Total deaths.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
Gurgaon	1	—	—	1	—	10	1	—	—	—	—	—	13
Delhi	—	1	—	1	—	—	—	—	—	—	—	—	2
Rohtak	—	—	—	—	2	15	—	—	—	—	—	—	17
Hissar	—	—	—	—	—	—	—	—	—	—	—	—	—
Sirsa	—	—	—	—	—	1	—	—	—	—	—	—	1
Karnal	—	—	1	—	—	—	—	—	—	—	—	—	1
Umballa	—	2	1	1	3	—	—	—	—	—	—	—	7
Simla	—	—	—	—	—	—	—	—	—	—	—	—	—
Ludhiana	—	—	—	—	1	—	1	—	—	—	—	—	2
Ferozepore	—	—	—	—	—	—	—	—	—	—	—	—	—
Montgomery	—	—	—	—	—	—	—	1	—	—	—	—	1
Mooltan	—	—	—	—	—	—	—	—	—	32	—	—	32
Muzaffargarh	—	—	—	—	—	—	—	—	—	—	—	—	—
Jhang	—	—	—	—	—	—	—	—	3	—	—	—	3
Dera Ghazi Khan	—	—	—	—	1	3	—	1	—	—	—	—	5
Jullundur	—	—	—	—	—	—	—	—	—	—	—	—	—
Hoshiarpur	—	—	—	—	—	—	—	—	—	—	—	—	—
Kangra	1	1	—	—	—	1	—	—	—	—	—	—	3
Gurdaspur	—	—	—	—	—	1	1	—	1	—	11	—	14
Amritsar	—	—	—	1	—	1	1	8	19	—	—	—	30
Lahore	2	2	—	2	—	2	119	474	117	4	—	—	722
Sialkot	—	—	—	—	—	—	—	42	388	33	—	—	463
Gujranwalla	—	—	—	—	1	1	2	66	168	33	—	1	272
Gujrat	—	—	—	—	—	2	53	191	283	43	—	—	572
Shahpur	—	—	—	—	—	157	291	41	15	—	—	—	504
Jhelum	—	—	—	—	—	40	42	132	63	24	—	—	301
Rawalpindi	—	—	—	—	—	2	109	343	160	11	1	—	626
Hazara	—	—	—	—	—	—	4	50	93	92	6	—	245
Peshawar	—	—	—	—	—	—	—	—	61	510	67	—	638
Kohat	—	—	—	—	—	—	—	—	—	3	19	2	24
Bannu	—	—	—	—	—	—	463	47	18	375	95	—	998
Dera Ismail Khan	—	1	—	—	—	—	9	—	32	117	81	—	240

The foregoing table is very striking, and it appeals with more force when we learn that the limit reached by cholera in 1875 as shown therein was the same limit that was reached in the epidemics of 1856 and 1861. The table shows, moreover, that epidemic cholera, whatever it may do in other countries, does not radiate in India, and it indicates the absolute failure of any retrogade movement of the cholera of 1876 over the districts occupied by it in 1875.

The relation of cholera to moisture and monsoon influences is strikingly illustrated by the following facts :—

I. Its perennial presence in the low-lying moist diluvial regions of the seaboard of Lower Bengal.

II. The exemption of places like Mooltan, except in exceptional seasons when the rainfall affects Mooltan.

III. The remarkable contrast exhibited in certain years, when cholera and famine were contemporary, between the famine and cholera districts respectively; where the crops failed, they failed from a relative absence of monsoon influences, and there cholera also failed to appear although prevailing epidemically in the contiguous tracts of country.

IV. And an extremely significant and corroborative fact may be added in evidence of the truthfulness of the cholera records. From the observation of a series of consecutive epidemics, Dr. Bryden was led to conclude that certain districts contiguous to the line of 80° east longitude were differentiated from other districts in their vicinity by the way in which they (the former) comported themselves in regard to cholera. Now, another observer, Mr. Eliot, meteorologist to the Government of Bengal, working from another altogether independent stand-point and direction, has discovered that these districts are also meteorologically differentiated.

He states that the North-western Provinces are here the gaol of two portions of the same current—one portion advancing towards them after deflection in Bengal and Orissa from the east; another portion of the same current passing up the valley of the Nerbudda and across Rajputana. Thus two portions of the same general atmospheric current advance and meet each

other at a considerable angle. Any one who has watched from a bridge the waters of a large river divided by the piers on the upper side of the bridge and meeting again at the lower side, will know that eddies are always found at and near the lower face of the pier, when the two portions of the current meet again. The same is and must be true in the case of the two portions of the same monsoon current which meet towards the line of 80° east longitude in the North-Western Provinces.

If the result of these meteorological observations published in 1878 be contrasted with the remarks of Dr. Bryden at page 164 of his report on cholera, published in 1869, the parallelism will be found to be striking.

Such are some of the leading features in the doctrines set forth by Dr. Bryden. It is not pretended that the foregoing affords anything more than an outline sketch. The discussion of a large number of other considerations especially in relation to cholera outbreaks as distinguished from cholera epidemics, must be deferred for the reports of other years.

Infection and Water Theory.

On the other hand, Dr. Snow first directed attention to the influence of impure water as a means by which the disease is communicated.

Dr. William Budd, while adopting this view, has enlarged it to embrace occurrences that cannot be reconciled with it. He holds that the poison of cholera is cast off with the characteristic discharge from the alimentary canal, and that the disease may be communicated—(1) by the soiled hands of the attendants; (2) by bed and body linen, carpets, &c., soiled by choleraic discharges; (3) by the discharges finding their way into sewers or the soil, and (*a*) through soil into wells or other reservoirs for drinking-water, (*b*) by rising into air as watery vapour, (*c*) by being dried and dispersed into the atmosphere as an impalpable dust. Mr. Simon contends that it cannot be too distinctly understood that the person who contracts cholera (in the United Kingdom) is *ipso facto*, demonstrated with almost absolute certainty to have been exposed to excremental pollution—excrement-sodden earth, excrement-reeking air, excrement-tainted water; these are for us, he says, the causes of cholera.

In brief, the doctrine of Europe embraces contagion as a central fact in the history of cholera: it holds that the disease depends upon a specific portable poison; that a specific material multiplies itself in the bodies of those the subject of its action; that the excreta of cholera patients, or of those who have been exposed to cholera infection without having at all, or in a slight degree, manifested its morbid effects, form the *materies morbi*, of which air or, much more commonly, water is the vehicle; and that whether such infective material, when introduced into a place, shall, as it were, effect a lodgment there and develop into an outbreak or an epidemic, will depend upon the presence or not of favouring insanitary and meteorological conditions. Without seeking to impugn the truth or stability of these doctrines, it must be allowed that the integrity of the whole is dependent on the mutual support of a series of propositions, not one of which can be said to be absolutely proven.

No theory or hypothesis of contagion or water infection as set forth by European observers is adequate to cover the phenomena of an *epidemic of cholera* as witnessed in this country. The only view which pretends to embrace them all, and to relegate each fact—each case of cholera—into its proper position in relation to the whole, is that set forth by Dr. Bryden. Whether it be right or wrong, adequate or inadequate, is not the present inquiry of the writer, which is to show that the basis of Dr. Bryden's inquiries is a basis of facts properly chronicled, which has hitherto never received the attention it merits. Had it been otherwise, had any naturalist like Mr. Huxley made the facts the subject of practical study, or had a man like Sir William Jenner, Dr. William Farr, or Mr. Simon, the necessary time and opportunity for tracing the progress of an epidemic in India by the light of the past history of epidemic cholera and with the advantage of Dr. Bryden's appreciation as to the relevancy of events one to another as they occurred and their relation to future events (forecasts), there cannot be a doubt that a logical candour would have compelled them to recognise the inadequacy of views which are put forward in England as if they were not only exclusively right,

but as if the system pursued there were the only logical and rigidly exact system of investigation by which the truth could be reached. There cannot be a doubt that the progress of the scientific observation and study of cholera in this country has been greatly hindered by the promulgation of theories and hypotheses by individuals of deservedly high reputation who have neither had time nor opportunity for discovering for themselves the inadequacy of the exclusive views they advocated; nor have such views been limited to authorities in Europe, for similar doctrines have been advanced in this country and these have been at once adopted in England as rigidly scientific and true, because they were founded on the methods of inquiry and corroborative of the views that obtained there.

For example, the Hurdwar pilgrims carried cholera into Mooltan in 1867; therefore, it was prophesied that, as Mooltan had become a great railway terminus, its known immunity from cholera—an immunity lasting for half a century—was to be overcome or destroyed. But from the commencement of 1868 to the end of 1875, out of a population exceeding one million in Mooltan, Mozuffargarh, and Dera Ghazi Khan, the districts tapped by the railway communications, 17 deaths from cholera were registered, although the Punjab had been invaded by no less than three epidemics within that period.

Hoshungabad suffered from cholera in the same week in 1818 and 1875; the town in the first year being in the centre of a wilderness, and in the other a station of the Great Peninsula Railway.

In the epidemic of 1875, cholera did not become localised in Jubbulpore, although occupying a position which tapped by rail and road the Ganges on the one hand, and the Berars and Northern Bombay on the other. Out of a population of 382,926, 11 persons only died of cholera in 1875. That there is nothing in Jubbulpore rendering it inimical to cholera, is proved by the fact that in the year following (1876) 1,278 persons died of cholera.

In the epidemic of 1869, 3,041 people died of cholera in the city of Umritsar; the entire Lahore district only mustered 300 deaths. In the succeeding epidemic of 1872, Umritsar city registered only 7 cholera deaths out of a population of 134,000.

In 1867 the Meean Meer cantonment suffered heavily; in the epidemic of 1869 it escaped altogether. The inference then made was that the water supply had been so secured from contamination that a future outbreak of cholera was not to be feared; but in the very next epidemic (1872) 185 cases, with 123 deaths from cholera, occurred out of a strength of 1,300.

In the epidemic of 1869 the Lahore Lunatic Asylum suffered out of all proportion to any other community. The cause was said to be contaminated drinking water, and the source of its contamination was supposed to have been pretty accurately determined; but in the two immediately succeeding epidemics the same Lunatic Asylum suffered severely; and, as Dr. Bryden remarks, the contingency of water poisoning, through foul sand, not being likely to occur three times in succession, it ceased to be urged in explanation.

In 1875 cholera occurred almost on the same days on the mountain tops of Dhurmsala, Simla, and Kasauli, at the same time that it appeared "in the "Deccan and in the Berars on the southern margin of the epidemic area "occupied."

Whilst this paper is being written the following occurrences have arisen which deserve a place here:—

On the night of the 12th September a patient in the 70th hospital, Subathu, suffering from enteric fever, became the subject of cholera. On the morning of 13th, seven more cases occurred; and after an interval of 20 hours, another case, and then another. There were in all 10 men attacked in the hospital; seven were patients suffering from enteric fever, one from chronic rheumatism, one from gonorrhœa, and one from ague: all, except the last, weakly men. All the men attacked had been at least a week (one had not left his bed for any purpose for 10 days) in hospital, which is the highest building in or about the station, 300 feet higher than the barracks, on the top of a conical hill, and separated from it and other buildings by a considerable interval. The elevation of Subathu is 4,253 feet above the sea. The bazaar, with population of 3,000, had no cases of cholera, and the troops and native population were singularly free from both cholera and diarrhœa.

The hospital consists of eight wards: three on ground floor, five on the

upper. The disease appeared in two of the former and in three of the latter. Some of the men attacked were widely apart from, and had no communication with each other, and used different latrines.

The water used for drinking and cooking purposes for hospital and barracks is derived from the same source, and is of excellent quality. The cooking utensils were in good condition. No clothing, bedding, or equipment from an infected source had been opened in the hospital. The hospital is well drained, and no insanitary condition of any kind could be found, and every attempt on the part of the local authorities to explain the outbreak, which naturally excited extreme interest, failed.

The weather during the week previous to the outbreak was the same as usual, save that on the 10th September there was a severe thunderstorm, accompanied by a heavy fall of rain, 4½ inches in 24 hours.

Surgeon-Major McCarthy in medical charge, a very careful and experienced officer, who furnished the foregoing particulars, was good enough to add the following. On the receipt of a communication from this office he wrote to the medical officer at Kasauli for particulars as to an alleged outbreak of cholera there. In reply, he ascertained that 6½ inches of rain fell there on the 10th, and that two fatal cases of cholera—both natives—occurred on the 12th, and a lady was seized on 15th, the last case of cholera, so that it stands thus:—

Subathu, 4½ inches rain on 10th; four cases of cholera on 12th.

Kasauli, 6½ inches rain on 10th; two cases of cholera on 12th.

On the 15th, the last cases occurred at both stations.

The distance between Kasauli and Subathu, both hill stations at 6,335 feet and 4,253 feet respectively, is 17 miles.

The disproportionate number of attacks of hospital patients, and the frequency with which cholera originated and persisted in a hospital at different stations, will be the subject of further remark hereafter.

Whether the cause of cholera be an entity at all has never been proved, any more than a cholera germ has ever been detected, and therefore the manufacture or production of such a cause in one region to be distributed in another, *there* to manifest its presence on human beings at certain seasons and under certain concurring conditions, may well seem open to question. But Dr. Bryden's hypothesis may claim to occupy the position of a theory in this respect, that it serves to include the facts, weave them together on a framework or system in harmony with that of other branches of natural history as a science. It may be that, after all, an explanation of cholera involves a question of dynamics, and is intimately connected with the condition of matter—material forces—rather than with matter itself; still considerations of this nature do not affect the fact that monsoon influences, and meteorological influences allied thereto, form one of the essential factors in cholera, nor the other facts of the definite geographical and chronometrical relations of epidemic cholera herein set forth. It is the association of two classes of phenomena, let the real bond of their union—in other words, its explanation as a causal relation—be what it may, that I desire to emphasise.

It is not, as has been assumed, any indirect evidence of the contagiousness of cholera that it has never reached certain countries which are supposed to have escaped infection from being separated from India by a wide expanse of sea and with relatively little intercommunication; for cholera does not appear to extend south of the equator, and even the Cape of Good Hope, with which such communication, during a long period of Indian history, was both frequent and common, has escaped hitherto.

It has been thought that an explanation of a cholera outbreak in a given year and district might be obtained by a reference to two things: the seeds or germs of the disease left by a previous epidemic, and their dormancy until the recurrence of certain favouring conditions, such as heat and moisture for example, renewed their activity. But let us take the Punjab as an example, and it is the conviction of every observer that epidemic cholera advances into his district, a conviction the truth of which can be demonstrated by the evidence of its epidemic advance from Lower Bengal, as seen in the increased cholera death-rate marking its progress.

In brief, there is no evidence to show that the cholera cause left after one epidemic invasion retains its potency for an indefinite period with occasional recurrences of manifestation; while, on the other hand, there are evidences of

an epidemic advance from Lower Bengal as the precursor of an epidemic in the Punjab.

The spread of an epidemic of cholera has been in no way altered by improved and more rapid means of communication in this country; and its course, instead of being with, is against the course of the great natural drainage of the country. It has never happened that an epidemic commenced in the Upper Provinces and gradually spread down the Ganges, the Jumna, or the Indus, or their tributaries; its advance has been exactly opposite. And, curiously enough, a series of maps lately issued with the intention of supporting the view that cholera spreads by water as a vehicle, only serves to illustrate an old fact, not that the water was the *vehicle*, but that low-lying places like those of rivers and watercourses are favourite habitats of cholera when present.

The course of cholera in the recent outbreak at Simla (1879) is alike inconsistent with the assumption of an infected source or sources of water supply, or its necessary connexion with dirt and overcrowding; for the facts of the last outbreak (1875) were repeated, viz., the great centre of the population (bazar and its immediate vicinity) was relatively spared, while the sparse population of the outlying, especially the low-lying, districts suffered disproportionately, illustrating that position (locality) has a greater influence in this country than probably anything else as a determining factor.

Cholera Infection.

It is, however, specially necessary to guard against the assumption that, because cholera, in its widespread, epidemic relations cannot be explained in India by human intercourse, infected water supply, &c., therefore the incidence of cholera in an individual or group of individuals never depends on any such cause. The instances in which the arrival of pilgrims, intercourse with a pilgrim or infected individual, travelling in a carriage that had been used by individuals tainted with cholera, and so forth, have preceded the appearance of cholera, are sufficiently numerous to warrant the assumption that a casual relation did exist between such occurrences, and that all reasonable and practical precautions should be taken on that assumption.

But recognising the full force of such occurrences as these, and allowing that every such *apparent* connexion between the two classes of phenomena was a *real* one, it cannot be maintained that they occupy more than a very subordinate position to other more general, primary, and important facts that have been observed in regard to epidemic cholera in this country.

We may recognise the truth of one series of facts, and there will still remain ample room for the play of such subordinate causes without in the least invalidating the position here assumed. What is wanted is a series of most carefully observed facts, rigidly investigated at the time by impartial and competent persons, animated by a desire to determine the bearing of all the phenomena from a local stand point, leaving to the consideration of others the relation that such locally observed phenomena bear to the whole series, which forms an independent study, and on that no mere local observer is competent to enter, much less to deal with satisfactorily.

Let us take the history of an outbreak of cholera in the 15th Hussars.

The 15th Hussars having served in Southern Afghanistan during the winter 1878–79 returned to Meerut in April 1879.

The regiment marched to "Shershah," a station on the Indus Valley State Railway, near Mooltan, and on the 23rd April embarked in the train to return to Meerut.

The regiment had been perfectly free from cholera on the march, and Shershah and its vicinity were also perfectly healthy as far as cholera was concerned.

At Meerut, however, cases of cholera had occurred in the bazar; 6 cases on 17th April and 11 between the 16th April and 5th May.

The first case among the men of the regiment occurred on the 28th April, three days after leaving the train, on which date 3 men were attacked. One more was attacked on the 29th, 1 on 1st May, 3 on 5th, and 3 on 6th, in all 11 men, of which number 9 died.

The noteworthy fact connected with this outbreak is that out of 27 men of B troop who travelled in one third class carriage, 7 were attacked by cholera (5 deaths) and 6 more suffered from diarrhœa, in all 13 out of 27 occupants of the carriage were affected.

The first 4 of the above cases were attacked on 28th and 29th within 27 hours of each other. Of 6 other cases that occurred in the same troop (B), 2 had not travelled by rail, but had joined B troop on its arrival at Meerut on 25th. The 6th and 7th cases were admitted from the same tent (camp in cantonment), and the 11th case came from a separate building, but the man belonged to B troop and visited it frequently. Thus a total of 10 out of 11 cases came from B troop, and of these 10, 7 had travelled in the same carriage. One man of "G" troop was attacked in hospital, but he had no communication with the cases of cholera.

The following is the distribution of men of B troop, 15th Hussars, who travelled in five compartments of a third class railway carriage, compartments boarded up to roof, from Shershah to Meerut, 23rd, 24th, and 25th April 1879 :—

No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Quiss.	Chard.	Robertson.	Brookes.	Smith, G.
Willard.	D. 29-4-79.	Legatt.	Foster.	Chafin.
Smith, G. H.	Sims.	Hamilton.	Laurie.	Carter.
	D. 5-5-79.	Marshal.	D. 1-5-79.	A. 5-5-79.
	Murphy.	D. 6-5-79.	Kent.	Smith, H.
	Smith, J.	Franklin.	D. 28-4-79.	Taylor.
	Mathews.	Williamson.	Salmon.	Palfreyman.
			A. 28-4-70.	
			Northern.	

(Seven admissions from cholera and five deaths up to 7th May from among men who travelled in this carriage.)

The facts connected with these cases were so remarkable that the Officiating Deputy Surgeon-General was at once communicated with, and every effort was made to identify and trace the history of the third class carriage in question before and subsequent to these occurrences, and to ascertain whether it had been used for the conveyance of pilgrims from the Hurdwar fair (which broke up a few days before) to the Punjab.

Much difficulty was experienced in eliciting the facts, but it was ascertained from this medical officer that "all the rolling stock of this description, as well "as many cattle trucks and luggage vans on the Sind, Punjab, and Delhi "Railway, were utilised for the conveyance of the thousands of pilgrims "returning from the Hurdwar fair." The military authorities, at the instigation of the Surgeon-General, put themselves in communication with the railway authorities, and the traffic manager of the Sind, Punjab, and Delhi Railway replied on 20th May in effect as follows :—

The only carriage of the kind described, viz., a third class, with one compartment marked for Europeans only, was traced and found to be No. 255.

"This carriage, No. 255, left Ghaziabad on the 14th April at 5 a.m. attached to the 'up-country' slow passenger train, and was used in the conveyance of ordinary passengers; of course they may or may not have been pilgrims, but it is very likely to have been the case, as a great number were returning from Hurdwar at the time."

This carriage remained in Lahore from the morning of the 15th April to the evening of the 21st, when it was sent to Mooltan. On arrival at Lahore it was sent to the carriage shop for the repair of a broken window. It remained unused between the 15th and 23rd April, on which latter date 27 men of B troop started in it from Shershah.

The traffic manager states that the carriages were washed and fumigated with sulphur before being used by the 15th Hussars.

It may be fairly assumed as certain that any third class carriage travelling on the line on or about 15th April was occupied by the cholera-stricken pilgrims. The first case of cholera reported as having occurred in a train was at 7.15 a.m. of 15th April at Umballa city, when a dead body was taken out of a

train 17 hours after the carriage had passed that point. It should be stated that in reply to queries from this office it was elicited that every precaution was taken *en route* to prevent the men incurring any risk of infection, and that, excluding that of the railway carriage, no common cause for the attack of the men in question could be discovered.

Take also the following:—

The bathing day at Hurdwar was the 12th April, and nearly on the morning of the 14th the railway station at Saharanpur was crowded with pilgrims, and cases of cholera were received into the cholera hospital there on the 14th. It was not until the 22nd April that the pilgrims from Hurdwar were disposed of by the railway authorities, who could not deport more than 6,000 pilgrims daily, and it is estimated that altogether 60,000 or 80,000 pilgrims arrived at Saharanpur, where they were encamped pending their departure.

Registers were kept of all cholera admissions, the point being carefully noted whether the attacked were pilgrims or not. The first case entered who had not been at Hurdwar was that of a chowkidar at the encampmant, then of a child in the city, whose parents had been at Hurdwar, next a Mussulman was attacked, and cases of the disease then began to appear indiscriminately over the city.

While four Europeans of the railway company were seized with cholera in the trains or at the railway stations, not a case occurred among the people remaining in the railway barracks or among the rest of the civil European community. Besides the European railway employés who died of cholera, there were many cases among the railway police and native workmen at the shops at this station. The remount stud establishment, however, numbering with their families about 1,200 persons, living near the gaol, escaped altogether.

It may be fairly concluded, then, that as a matter of scientific judgment or logical deduction we are not at all warranted in dogmatically asserting that cholera is never infectious; in fact, in the present state of our knowledge, it would be criminal to ignore reasonable precautions in this respect. One might go further and ask whether there were anything unreasonable in the belief that infection may elsewhere than India occupy an important, while here it holds a subordinate, position in the factors of this disease.

What can be more different than the climatic conditions of India and Europe. Hindostan possesses a very special physical geography; its seasons recur with the utmost regularity, and the normal limits of its meteorological (monsoon) agencies serve to mark out natural areas. This regularity is impressed upon everything that has life or appertains to life, no less upon the vegetable world than upon the diseases to which man is subject. Endemic diseases have their seasons of prevalence, and their causes occasionally transgress the limits of their production, invading as an epidemic other than contiguous areas, and no one can fail to observe that there is a certain regularity or rhythmical character impressed on the common diseases of this country. It would be considered conformable to our expectations and knowledge that a plant whose habitat was India should as an exotic elsewhere exhibit modifications under the new and altered conditions environing it, and why not disease like cholera when translated from its home?

We can recognise a disease of the typhus group here as readily by its contagious properties as in England, and in dealing with this group Dr. Bryden indicates very clearly that he is a strenuous supporter of the doctrine of contagion, hence there is nothing new or foreign to his habits of thought in recognising its influence as a propagator of disease.

Amid the doubt and difficulties surrounding this question of infection in relation to cholera, there seemed to be one portion of the population of India, that of the gaols, specially circumstanced for throwing a true light on this subject.

In the Punjaub gaols there were 98 deaths from cholera for the nine years from 1868 to 1876 out of a population of 120,000, as compared with 208 cholera deaths in a population of 95,000 in the previous nine-year period, there having been three epidemics of cholera in each such (nine-year) period respectively.

If we could only determine the cause or causes for this great diminution, the clue to something to which our practical energies might be advantageously directed would be discovered. With this view I addressed a series of questions

to Dr. Dallas, the Inspector-General of Gaols, Punjaub, and he has been good enough to furnish the following particulars.

Dr. Dallas attributes the improvement which has taken place during the last 15 or 16 years in the health of the jail population of this Province mainly, if not entirely, to the following causes :—

"I. The increase in the space allotted in the barrack to each prisoner. In former times when I was Superintendent of a central prison and when I first became Inspector-General the allowance per man was 400 cubic feet; no reference whatever was made to superficial space. In the winter of 1863–64 we had a very virulent outbreak of relapsing fever (or, as I think it ought more correctly to be called relapsing typhus). In reporting to Government on this outbreak, I drew attention among other sanitary defects to the want of lateral space, and I showed that in our barracks the prisoners slept with little more than a foot of space between the faces of any and every two of them; this was in 1864; in that year the Prison Committee ordered by Sir John (afterwards Lord) Lawrence assembled, and among other things they dealt with the space per man to be given to prisoners in barracks; this was raised to 648 cubic feet; and vastly more important, the matter of superficial or lateral space was for the first time dealt with and fixed at 54 superficial feet (9×6); this was found to involve the necessity of supplying so large an amount of increased accommodation as to preclude all possibility of its being given and it was also found to be excessive; the allowance was therefore reduced to 36 superficial feet ($9' \times 4'$). I should state the standard barrack is 18′ wide; the prisoners sleep in two rows, so that longitudinally each prisoner has 9′ of space; 4′ wall space was added to this, and so he got his 36 square feet. This order was issued in 1865, and immediately we set about giving effect to it.*

"II. In 1864 the attention of Government was drawn to the insufficiency of the clothing allowed the prisoners. It was not only insufficient at Lahore, taking this place as the centre, but it was fixed on no system, or rather on one uniform system; the Peshawur, Hazara, Rawul Pindi, Derajat, and Dhurmsalla prisoners got the same allowance as the Delhi, Rohtuk, Gurgaon, and Kurnal prisoners—a system that was on the face of it wrong. The Government at once admitted this, and I drew up a scale of clothing which came into force in 1865; this scale was formed with regard to the different climatic conditions existing in different parts of the Province.

"III. The food of the prisoners also received attention. It was recognised that some of the prisoners were flesh-eaters, *e.g.*, hill-men and Pathans; others, especially the pastoral tribes from the Bar districts, consumed large quantities of milk, butter-milk, and curds, and a scale of diet was fixed accordingly. This too was in 1864.

"IV. That disease was frequently introduced into the gaols by recently admitted prisoners was a fact everyone acquainted with our gaols was cognisant of. To prevent this, a quasi-quarantine system was established. I use the expression quasi-quarantine because I do not desire to be understood to say we established a quarantine in the proper strict meaning of the word. We did not, and we could not, do so; but we brought all new admissions under close surveillance; in fact, established a quarantine of surveillance, and thus were enabled to detect at once and isolate cases of sickness occurring among prisoners newly admitted; the result of this measure was eminently and very manifestly satisfactory. At first starting my quarantine arrangements were limited to setting aside one ward for new admissions. I need not stop to point out how very unsatisfactory this arrangement was, and indeed is, for in some gaols it is all I can do even now; but orders were issued to provide a certain number of cells for the isolation of new prisoners, and in some gaols these have been provided. The establishment of this quarantine of surveillance was in 1865–66.

"V. In 1868 medical officers were appointed superintendents of the various gaols in the province. This was a most important move in all ways, and especially as regards sanitary matters.

* I ought to mention in connexion with this heading that gradually (1864–68) all gaols were supplied with tents (some for 25 and others for 50 per cent. of the strength), these tents and also workshop were to be used to relieve crowding in the sleeping barracks, so that it has rarely happened that a man has been robbed of his 36 square feet since orders were issued that no more than 32 prisoners were to be put to sleep in a ward; formerly there was no limit.

"Various other measures in view to the protection of the weak and infirm, the changes in temperature, the allotment of labour in proportion to the age and strength of the prisoners, personal cleanliness, the protection of the wells for drinking purposes, the filtering and examining of the drinking water, and other matters connected with the health of the jails, have from time to time received attention, and appropriate orders have been issued. These orders I have embodied in a gaol manual and in subsequent departmental circular.

"All the changes and improvements above noted may be taken as applying generally, I think to the gaols of the various provinces, and as regards time, the year 1865 may be fairly taken as the starting point."

Practical Observations.

We seem to have grasped a few practical facts in regard to this disease.

And the first is the influence of position in localising it. On a large scale this is observable at Peshawar and the districts beyond monsoon influences.

Experience has abundantly shown that when cholera has once appeared at Peshawar, an outbreak on a large scale may take place at any time from May until November. Acting on this knowledge, and on the observation that there is commonly an interval of ten days between the first case or two and the manifestation of an epidemic, the period has been successfully utilised on more than one occasion in withdrawing the troops to neighbouring stations (Cherat and Nowshera).

The Terai approximates in its climatic conditions to those regions of perennial moisture where the disease is endemic, and here, too, it is frequently localised as in the winter and spring immediately preceding the Hurdwar gathering. River courses, low-lying districts, valleys and khuds, or even the tops of hills where these happen to be dominated by other and loftier hills in their vicinity; in fact, anything that shuts in a neighbourhood and impedes the freedom of atmospheric currents has a similar effect.

Again, the movement of troops for even short distances from an infected building or locality has been repeatedly followed by the best results. The instances in which it has failed, and they are many, may probably be ascribed to this, that the incidence of cholera appears to occur in two forms, one when a corps is attacked in community; the other, when one or more independent units are at first affected. In the former case the disease will prevail in the community, spite of movements, for 8 or 10 days.

The effect of aggregation as opposed to segregation of individuals. The European corps suffer far more than Native troops in the same cantonment, and the European soldier far more than the European officer. Apart from the predisposition of race, which undoubtedly is a factor, as in the case of the Goorkhas, it has been shown that when Native troops are aggregated together as they were when moved down the Ganges in Native boats, they died of cholera as much as, if not more than, European troops occupying a barrack room with a common atmosphere; and parallel to this is the fact that on the march the officer shares and shares equally with the European private soldier the liability to be attacked with cholera, while the Native soldier also loses on the march his relative immunity from cholera.

Again, the disproportionate number of attacks occurring in hospital is a very striking and significant phenomenon, which has been specially observed during the present year (1879). The disease has frequently originated as well as continued in a hospital. That this can scarcely be attributable to increased predisposition from the weakly state of the patients is indicated by the fact that young and lusty men, the subjects of trifling venereal complaints, have frequently been its victims; rather it would seem that the cause must be ascribed to the *continuous* nature of the occupation of a hospital ward as compared with that of a barrack-room, with a common atmosphere which becomes laden with moisture or organic matter.

And there is another point in which the private soldier's life contrasts with that of his officer, viz. night duty, which certainly in malarious stations and seasons, and probably during an epidemic of cholera, is not without considerable influence.

APPENDIX

Annual Abstract of Meteorological Observations

GIBRALTAR. Lat. 36° 6′ N.

Month.	Mean Pressure.	Air Temperature. Hourly Means. 9 a.m.	9 p.m.	Daily Means. Simple.	Reduced.	Means of. Min.	Max.	Abs. Min. Temp.	Day.	Abs. Max. Temp.	Day.	Tension of Vapour.	Relative Humidity. Mean.	Minimum.	Day.
January	30·260	51·9	—	—	—	58·4	61·8	39·5	13th	67·3	18th	·334	83·0	60·0	13th
February	30·273	54·6	—	—	—	51·1	61·8	39·0	3rd	69·8	20th	·377	87·0	64·0	1st
March	30·117	57·3	—	—	—	52·3	64·4	43·3	18th	74·6	2nd	·372	79·0	55·0	2nd
April	30·028	64·4	—	—	—	57·9	72·2	48·8	1st	80·0	13th	·473	78·0	67·0	17th
May	30·005	67·4	—	—	—	61·3	76·6	57·8	4th	89·2	21st	·575	85·0	65·0	3rd
June	30·009	72·8	—	—	—	65·5	80·5	59·3	4th	87·2	28th	·655	81·0	64·6	19th
July	29·976	75·6	—	—	—	68·9	83·6	61·5	1st	91·0	22nd	·701	80·6	53·0	3rd
August	29·956	74·6	—	—	—	67·6	85·3	64·5	22nd	90·5	19th	·634	74·0	56·0	15th
September*	29·988	—	—	—	—	—	—	—	—	—	—	—	—	—	—
October*	30·004	—	—	—	—	—	—	—	—	—	—	—	—	—	—
November*	29·994	—	—	—	—	—	—	—	—	—	—	—	—	—	—
December	30·035	54·9	—	—	—	49·8	63·5	44·4	1st	76·5	12th	·353	80·0	51·0	8th
Mean	30·054	63·7	—	—	—	59·2	72·2	50·9	—	80·7	—	·496	80·7	59·4	—

* September to 1st December observatory under repairs. Temperature and rainfall for nine months only.

MALTA. Lat. 35° 53′ N.

January	30·054	55·2	—	—	—	50·4	58·3	40·0	27th	64·0	10th	·319	71·5	54·8	21st
February	30·226	56·5	—	—	—	51·6	59·6	47·0	1st	62·8	25th	·341	74·1	64·0	3rd
March	30·015	58·4	—	—	—	52·6	61·4	46·4	16th	68·8	30th	·342	69·0	51·0	15th
April	29·931	62·9	—	—	—	56·4	66·7	51·0	1st	73·8	6th	·405	71·0	52·0	19th
May	29·953	69·9	—	—	—	63·5	74·2	59·2	4th	85·0	28th	·523	70·9	45·2	21st
June	29·980	76·5	—	—	—	69·6	80·6	65·0	3rd	88·0	6th	·623	68·2	47·0	6th
July	29·963	81·7	—	—	—	73·3	85·4	67·8	6th	93·0	24th	·647	59·1	39·0	12th
August	29·884	82·7	—	—	—	75·1	86·0	81·6	2nd	92·0	20th	·755	65·2	35·0	19th
September	29·885	78·2	—	—	—	71·3	80·7	67·4	6th	89·4	2nd	·676	72·6	59·1	26th
October	30·042	76·1	—	—	—	69·3	79·0	61·4	25th	88·4	27th	·656	73·0	56·9	31st
November	29·988	68·0	—	—	—	63·0	71·6	56·4	23rd	77·0	14th	·502	73·0	59·0	4th
December	29·932	61·4	—	—	—	55·4	66·3	52·0	6th	73·0	11th	·419	78·0	56·0	30th
Mean	29·988	68·9	—	—	—	62·6	72·5	57·9	—	79·6	—	·517	70·5	51·8	—

SCUTARI. Lat. 41° N.

January	30·040	39·8	—	—	—	35·0	46·8	25·3	20th	59·2	26th	·206	83·2	58·2	27th
February	30·161	40·9	—	—	—	33·4	48·8	23·8	15th	58·2	26th	·217	84·8	64·4	14th
March	29·911	45·8	—	—	—	39·2	54·1	27·8	1st	70·4	31st	·239	75·3	55·6	30th
April	29·855	55·9	—	—	—	45·0	65·8	36·8	5th	78·4	1st	·338	75·9	60·6	22nd
May	29·923	64·8	—	—	—	51·3	74·4	36·8	5th	86·2	24th	·419	68·2	48·2	13th
June	29·767	72·2	—	—	—	59·6	82·3	50·7	3rd	90·6	16th	·571	71·2	46·4	8th
July	29·810	77·7	—	—	—	62·9	89·6	56·0	21st	97·8	11th	·570	59·3	44·0	23rd
August	29·822	76·6	—	—	—	62·1	88·0	55·0	8th	94·6	25th	·598	66·0	52·4	24th
September	29·899	73·9	—	—	—	60·4	84·5	49·7	30th	100·4	1st	·537	63·6	48·2	13th
October	30·049	64·3	—	—	—	52·3	75·4	46·3	4th	80·0	2nd	·459	75·5	55·6	8th
November	30·046	59·2	—	—	—	49·7	69·1	37·8	10th	78·6	6th	·396	76·8	46·6	13th
December	29·878	50·5	—	—	—	44·0	58·1	28·5	26th	69·4	12th	·300	78·8	53·8	1st
Mean	29·930	60·1	—	—	—	49·6	69·7	39·5	—	80·3	—	·404	73·1	52·6	—

No. XIII.

taken at Foreign Stations in the Year 1878.

Long. 5° 20′ W. Height of Barometer Cistern above Sea, 53 feet.

Mean Amount of Cloud.	Rainfall.			Weather.								Wind.								
				Number of Days of								Number of Observations under each Point.								
	Total.	Maximum.	Day.	Rain.	Snow.	Hail.	Thunder Storm.	Fog.	Clear Sky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
3·2	0·72	0·59	30th	4	—	—	—	9	19·0	3·0	2	2·0	2·0	11·	0·5	—	—	9·5	6·0	—
5·7	5·70	2·01	22nd	9	—	1	2	—	9·0	11·0	3	0·5	2·5	18·	1·5	—	—	3·5	2·0	—
5·3	2·77	0·86	16th	9	—	—	1	—	11·0	11·5	4	0·5	1·0	15·5	1·0	—	—	12·5	0·5	—
4·8	0·94	0·27	7th	6	—	—	—	—	15·0	6·0	2	1·5	0·0	7·5	—	—	—	21·	—	—
3·9	0·65	0·35	4th	5	—	—	1	—	16·0	2·5	2	2·5	0·0	11·5	—	—	—	17·	—	—
2·3	0·00	0·00	—	—	—	—	—	—	25·0	0·5	—	—	6·0	6·5	5·5	1·0	5·5	1·0	1·5	3·0
2·6	0·00	0·00	—	—	—	—	—	—	21·0	0·0	3	—	—	16·0	—	—	—	15·0	—	—
2·4	0·00	0·00	—	—	—	—	—	—	25·0	0·0	—	2·5	5·5	3·5	—	—	4·5	14·0	1·0	0·0
4·2	—	—	—	—	—	—	—	—	13·5	1·0	—	0·5	9·0	15·5	—	—	1·0	3·0	1·0	0·0
3·4	—	—	—	—	—	—	—	—	18·0	0·5	—	3·0	1·0	12·5	—	0·5	2·0	8·0	4·0	0·0
3·7	—	—	—	—	—	—	—	—	16·0	1·5	—	8·0	2·0	7·0	—	—	—	13·0	—	—
4·8	7·23	3·30	12th	12	—	—	—	—	13·0	6·0	3	8·5	1·0	9·5	—	—	—	10·0	2·0	—
3·8	18·01	3·30	12th Dec.	45	—	1	4		201·5	43·5	19	29·5	30·0	134·0	8·5	1·5	13·0	127·5	18·0	3·0

Long. 14° 30′ E. Height of Barometer Cistern above Sea, 70 feet.

6·5	3·01	0·65	2nd	18	—	—	—	—	1·0	17·0	—	3·0	2·5	—	2·5	—	2·5	4·5	16·0	—
6·0	2·36	0·98	20th	12	—	—	—	—	1·5	7·5	—	1·5	5·5	1·0	7·0	—	2·0	1·0	10·0	—
5·0	0·67	0·20	20th	10	—	—	—	—	5·5	9·5	—	1·0	3·5	2·0	4·0	1·0	4·0	1·0	14·5	—
5·0	0·76	0·67	13th	4	—	—	—	—	4·0	8·0	—	1·0	2·0	1·0	3·0	0·5	5·5	1·0	16·0	—
4·0	0·00	0·00	—	—	—	—	—	—	9·5	6·0	—	1·0	10·5	2·5	4·0	0·5	1·0	—	11·5	—
4·0	0·00	0·00	—	—	—	—	—	—	7·0	2·5	—	1·0	12·5	0·5	7·5	0·0	0·0	0·0	8·5	—
1·0	0·00	0·00	—	—	—	—	—	—	25·5	0·0	—	1·0	9·0	1·0	5·5	0·0	0·5	0·5	13·5	0·0
0·5	0·00	0·00	—	—	—	—	—	—	28·0	0·0	—	1·0	10·0	3·0	7·0	0·0	1·0	0·0	9·0	—
2·5	2·78	0·85	8th	8	—	—	4	—	20·0	0·5	—	3·0	6·0	—	4·0	—	4·0	—	13·0	—
4·0	1·35	1·30	13th	3	—	—	—	—	13·5	5·0	—	1·0	3·0	4·0	12·0	1·0	4·0	—	6·0	—
5·0	3·88	3·50	11th	7	—	—	1	—	8·5	9·0	—	1·0	2·0	1·0	9·0	1·0	2·0	2·0	12·0	—
4·5	2·15	0·70	2nd	8	—	—	—	—	12·5	5·0	—	0·0	2·0	0·0	3·0	—	7·0	4·0	15·0	—
4·0	16·96	3·50	11th Nov.	70	—	—	5	—	136·5	70·0	—	15·5	68·5	16·0	68·5	4·0	33·5	14·0	145·0	—

Long. 29° 3′ E. Height of Barometer Cistern above Sea, 60 feet.

8·0	4·32	0·86	25th	13	8	—	—	—	3·5	23·0	1	5·5	8·5	4·5	2·0	3·5	3·0	2·5	1·0	0·5
6·2	1·83	0·48	12th	11	5	—	—	1	7·0	13·5	—	5·5	4·5	2·0	0·5	3·0	7·0	1·5	—	4·0
6·8	4·38	1·12	9th	21	2	3	1	—	7·0	18·0	1	5·0	4·0	1·0	0·5	7·0	6·5	5·5	0·5	1·0
6·0	4·38	1·24	23rd	15	—	—	1	—	9·0	14·5	—	4·5	6·5	1·5	2·0	6·5	3·0	—	1·0	4·5
3·4	0·55	0·36	3rd	5	—	—	—	—	20·0	6·0	—	6·5	8·5	1·5	—	7·0	4·0	0·5	—	3·0
4·2	2·61	1·11	8th	8	—	—	4	—	15·0	6·0	—	8·0	8·5	0·5	—	5·5	4·5	1·0	0·5	1·0
2·3	0·72	0·67	5th	4	—	—	2	—	23·0	1·5	—	4·5	10·0	2·5	—	3·0	8·5	0·5	0·5	1·5
3·8	1·76	1·35	1st	5	—	—	1	—	16·5	6·0	—	2·5	17·0	2·0	—	1·0	6·0	1·0	0·5	1·0
4·5	2·42	1·25	17th	8	—	—	2	1	11·5	7·0	—	5·0	12·0	4·0	0·5	2·5	2·5	0·5	—	2·0
3·9	0·80	0·64	7th	4	—	—	—	1	17·0	5·5	—	5·5	8·0	3·5	2·0	1·5	6·0	0·5	0.5	3·0
5·8	1·46	0·57	10th	9	—	—	3	7	9·5	13·0	—	2·5	2·0	6·5	1·0	4·5	6·5	1·0	—	6·0
7·7	9·32	1·10	16th	25	2	1	1	—	4·0	21·0	4	5·0	2·5	5·0	—	9·5	6·0	1·0	1·0	0·5
5·2	34·55	1·35	1st Aug.	128	17	4	15	10	143·0	135·0	6	60·0	92·0	34·5	8·5	54·5	63·5	15·5	5·5	28·0

April, half-day short; June, half-day short; October, half-day short; September, 1 day short; December, half-day short. } three days.

Appendix

Annual Abstract of Meteorological Observations

Fort Napier, Natal. Lat. 29° 3′ S.

Month.	Mean Pressure.	Air Temperature. Hourly Means. 9 a.m.	9 p.m.	Daily Means. Simple.	Reduced.	Means of Min.	Max.	Abs. Min. Temp.	Day.	Abs. Max. Temp.	Day.	Tension of Vapour.	Relative Humidity. Mean.	Min. Temp.	Day.
January	29·815	75·9	—	—	—	62·7	87·8	55·9	13th	111·7	8th	·555	59·0	30·0	9th
February															
March															
April															
May															
June	30·015	57·7	—	—	—	43·2	75·3	34·0	29th	84·0	26th	·256	53·0	40·0	16th
July	29·955	57·1	—	—	—	43·9	75·6	35·0	1st	88·0	30th	·233	49·0	23·0	13th
August	30·030	57·9	—	—	—	43·7	72·1	36·4	14th	90·0	19th	·253	50·5	32·0	19th
September	29·916	68·9	—	—	—	50·8	85·0	33·7	14th	101·8	10th	·344	47·0	25·0	28th
October	29·799	72·9	—	—	—	53·7	88·6	44·7	14th	109·2	6th	·342	42·0	23·0	28th
November	29·869	72·9	—	—	—	58·2	81·1	44·5	10th	109·8	4th	·474	54·0	27·0	3rd
December	29·798	71·2	—	—	—	58·4	81·3	52·0	14th	102·0	27th	·409	53·0	27·0	11th
Mean	29·899	66·8	—	—	—	51·8	80·8	42·0	—	99·5	—	·358	50·9	29·0	—

* Mean of 8 months only.

Sierra Leone. Lat. 8° 29′ N.

Month.	Mean Pressure.	Air Temperature. Hourly Means. 9 a.m.	9 p.m.	Daily Means. Simple.	Reduced.	Means of Min.	Max.	Abs. Min. Temp.	Day.	Abs. Max. Temp.	Day.	Tension of Vapour.	Relative Humidity. Mean.	Min. Temp.	Day.
January	29·917	81·6	—	—	—	75·5	90·2	73·0	23rd	94·0	15th	·927	85·0	76·0	17th
February	29·958	84·0	—	—	—	75·2	92·8	73·0	6th	96·0	22nd	·967	82·5	73·0	28th
March	29·911	86·3	—	—	—	76·0	93·5	72·0	21st	95·0	1st	1·014	80·5	73·0	16th
April	29·892	86·6	—	—	—	76·6	92·6	71·0	20th	94·0	1st	1·068	83·6	77·0	14th
May	29·968	84·7	—	—	—	75·2	92·0	70·0	5th	95·0	4th	·995	80·0	73·0	24th
June	29·989	82·6	—	—	—	74·2	89·0	71·0	7th	94·0	6th	·962	85·2	76·0	6th
July	30·009	79·0	—	—	—	72·2	85·2	70·0	4th	89·0	13th	·887	96·0	53·0	29th
August	30·005	78·6	—	—	—	73·3	85·0	70·0	13th	90·0	23rd	·889	95·9	80·0	30th
September	29·971	80·6	—	—	—	73·4	86·6	71·0	1st	92·5	28th	·926	89·0	76·0	10th
October	29·947	81·4	—	—	—	73·1	89·0	70·0	13th	94·0	29th	·869	81·0	75·0	28th
November	29·958	83·2	—	—	—	73·7	90·8	69·0	2nd	94·0	7th	·956	85·0	76·0	3rd
December	29·919	83·5	—	—	—	73·9	90·3	67·0	31st	95·0	9th	1·005	87·5	80·0	10th
Mean	29·954	82·7	—	—	—	74·4	89·7	70·6	—	93·5	—	·957	85·9	74·0	—

Barbadoes. Lat. 13° 4′ N.

Month.	Mean Pressure.	Air Temperature. Hourly Means. 9 a.m.	9 p.m.	Daily Means. Simple.	Reduced.	Means of Min.	Max.	Abs. Min. Temp.	Day.	Abs. Max. Temp.	Day.	Tension of Vapour.	Relative Humidity. Mean.	Min. Temp.	Day.
January	30·043	81·0	—	—	—	73·9	85·6	71·0	25th	87·0	1st	·758	72·0	64·0	25th
February	30·061	82·6	—	—	—	74·3	87·1	72·0	7th	88·0	25th	·748	67·0	59·0	2nd
March	30·046	83·4	—	—	—	75·1	88·0	69·0	1st	89·5	17th	·739	65·0	60·0	7th
April	29·992	84·6	—	—	—	76·2	88·6	70·0	25th	92·0	7th	·741	62·5	55·5	4th
May	30·029	84·7	—	—	—	77·1	87·7	75·0	27th	92·0	2nd	·813	68·0	58·0	7th
June	30·063	84·2	—	—	—	77·0	87·7	75·0	3rd	89·0	10th	·826	71·0	62·0	24th
July	30·028	84·5	—	—	—	76·4	87·7	75·0	6th	89·0	21st	·829	70·0	60·0	31st
August	30·042	84·3	—	—	—	75·5	87·6	74·0	7th	90·0	31st	·858	72·0	61·0	1st
September	29·981	85·0	—	—	—	76·8	87·8	73·5	8th	90·0	15th	·872	68·0	64·0	24th
October	29·946	85·0	—	—	—	76·2	88·1	73·0	13th	93·0	16th	·872	71·5	61·0	17th
November	29·952	82·6	—	—	—	75·0	87·1	71·0	27th	88·5	1st	·867	78·0	65·2	3rd
December	29·990	81·8	—	—	—	75·0	86·0	72·0	17th	88·0	3rd	·782	72·0	57·5	18th
Mean	30·014	83·6	—	—	—	75·7	87·4	73·4	—	89·7	—	·807	69·7	60·6	—

No. XIII.—*continued.*

taken at Foreign Stations in the Year 1878.

Long. 30° 2′ E. Height of Barometer Cistern above Sea, 2,200 feet.

Mean Amount of Cloud.	Rainfall.			Weather.								Wind.								
				Number of Days of								Number of Observations under each Point.								
	Total.	Max.	Day.	Rain.	Snow.	Hail.	Thunder Storm.	Fog.	Clear Sky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
7·9	2·79	1·12	29th	17	—	—	10	—	4·5	23·5	—	1·0	7·0	17·0	2·0	—	0·5	—	3·0	0·5
0·7	—	—	—	—	—	—	—	—	28·0	1·5	—	—	5·5	16·0	5·5	1·0	0·5	0·5	0·5	0·5
2·2	0·01	0·01	14th	1	—	—	1	—	22·5	5·5	—	1·0	4·5	16·0	6·0	0·5	—	1·0	2·0	—
3·0	0·25	0·15	23rd	3	—	—	—	—	20·5	7·0	—	2·0	5·0	18·0	2·5	1·0	1·0	—	1·5	—
3·5	0·14	0·11	30th	2	—	—	—	—	19·0	9·0	—	0·5	7·5	16·5	2·0	—	0·5	0·5	2·0	0·5
5·1	0·73	0·22	19th	4	—	1	6	—	14·0	15·0	—	—	7·5	14·5	4·0	0·5	—	1·5	3·0	—
7·4	3·71	0·69	14th	20	—	2	9	—	7·0	23·5	—	—	13·5	9·0	4·0	—	—	1·5	2·0	—
7·2	3·06	0·56	31st	19	—	2	12	—	6·0	21·0	—	1·0	12·0	11·5	5·0	—	—	—	1·0	0·5
4·6	10·69	1·12	29th Jan.	66	—	5	38	—	121·5	105·0	—	5·5	62·5	118·5	30·5	3·0	2·5	5·0	15·0	2·0

Long. 13° 9′ W. Height of Barometer Cistern above Sea, 224 feet.

2·6	3·29	1·61	4th	4	—	—	1	—	25·0	—	—	1·0	0·5	15·5	0·5	0·5	—	5·5	4·5	3·0
3·0	—	—	—	—	—	—	1	—	24·0	—	—	1·0	—	7·5	—	—	—	11·5	5·5	2·5
2·9	0·45	0·20	12th	3	—	—	1	—	26·0	—	—	3·5	—	6·0	—	—	—	16·0	3·0	2·5
3·2	9·04	2·70	19th	14	—	—	6	—	25·0	—	—	1·5	1·0	1·5	—	—	—	19·5	5·0	1·5
3·4	12·32	4·16	13th	18	—	—	9	—	20·5	—	—	—	—	7·5	—	—	—	17·5	1·0	5·0
3·8	23·66	8·41	13th	20	—	—	7	—	13·5	—	—	1·0	1·0	7·0	—	—	1·0	19·0	—	1·0
3·8	41·18	6·66	8th	26	—	—	1	—	9·5	—	—	1·0	1·0	2·0	—	—	1·0	17·0	1·0	8·0
3·5	44·13	7·17	15th	25	—	—	2	—	15·0	—	—	—	—	1·0	—	—	13·0	17·0	—	—
3·6	44·47	9·42	24th	27	—	—	6	—	14·5	—	—	—	—	1·5	—	3·5	10·5	8·0	—	6·5
3·7	16·01	4·15	6th	17	—	—	9	—	16·0	—	—	—	—	4·5	—	5·0	7·0	5·0	1·0	8·5
3·5	6·27	2·32	7th	11	—	—	13	—	15·0	—	—	1·0	—	2·0	—	1·0	7·0	5·0	1·0	13·0
3·7	2·54	1·30	1st	4	—	—	4	—	14·5	—	—	—	—	6·0	—	1·0	—	1·0	1·0	22·0
3·4	203·4	9·42	24th Sept.	169	—	—	60	—	218·5	—	—	10·0	3·5	62·0	0·5	11·0	39·5	142·0	23·0	73·5

Long. 59° 40′ W. Height of Barometer Cistern above Sea, 30 feet.

4·1	2·20	0·35	7th	4	—	—	—	—	16·0	3·5	—	4	21	5	1	—	—	—	—	—
3·3	0·04	0·02	6th	2	—	—	—	—	16·5	0·5	—	2	22	—	3	—	—	1	—	—
3·7	0·41	0·19	4th	4	—	—	—	—	16·0	—	—	2	27	2	—	—	—	—	—	—
3·3	1·56	1·34	24th	2	—	—	—	—	19·0	0·5	—	—	28	2	—	—	—	—	—	—
3·8	7·53	2·74	26th	12	—	—	—	—	14·5	0·5	—	—	18	12	1	—	—	—	—	—
3·9	2·65	1·20	20th	15	—	—	—	—	15·0	0·5	—	2	21	6	1	—	—	—	—	—
4·0	5·72	0·80	3rd	12	—	—	—	—	16·0	3·0	—	—	19	6	6	—	—	—	—	—
3·5	9·00	1·85	20th	13	—	—	—	—	20·0	4·5	—	—	24	3	4	—	—	—	—	—
4·0	9·57	3·00	1st	18	—	—	—	—	15·5	3·5	—	1	8	10	8	2	1	—	—	—
4·1	7·17	1·50	18th	15	—	—	—	—	20·5	5·0	—	—	21	1	8	—	1	—	—	—
4·5	6·89	2·06	26th	9	—	—	—	—	19·0	10·0	—	2	21	4	2	—	1	—	—	—
3·3	3·11	2·12	7th	10	—	—	—	—	25·5	2·0	—	—	28	3	—	—	—	—	—	—
3·8	55·8	3·00	1st Sept.	116	—	—	—	—	213·5	33·5	—	13	258	54	34	2	3	1	—	—

Annual Abstract of Meteorological Observations

Newcastle, Jamaica. Lat. 18° 62′ N.

Month.	Mean Pressure.	Air Temperature. Hourly Means. 9 a.m.	9 p.m.	Daily Means. Simple.	Reduced.	Means of Min.	Max.	Abs. Min. Temp.	Day.	Abs. Max. Temp.	Day.	Tension of Vapour. Mean.	Relative Humidity. Mean.	Min.	Day.
January* -	30·147	66·5	—	—	—	57·4	77·2	56·0	22nd	80·2	22nd	·530	81·5	64·0	19th
February† -	30·138	68·0	—	—	—	58·4	79·2	55·0	21st	88·0	11th	·549	80·0	63·0	9th
March -	30·143	69·8	—	—	—	60·7	80·5	50·0	5th	89·0	2nd	·557	74·0	60·0	31st
April -	30·112	70·3	—	—	—	59·8	81·3	48·0	5th	87·8	15th	·512	69·0	54·0	29th
May -	30·024	72·1	—	—	—	61·3	80·8	57·3	6th	87·0	16th	·584	74·0	61·0	23rd
June -	30·051	72·8	—	—	—	62·2	80·8	60·0	2nd	87·0	29th	·582	70·0	55·0	19th
July -	30·055	72·1	—	—	—	62·8	81·0	59·0	25th	86·0	28th	·575	74·0	58·0	5th
August -	30·036	71·0	—	—	—	61·7	79·7	56·0	14th	86·7	4th	·579	75·0	62·0	9th
September	29·283	70·2	—	—	—	61·7	78·4	59·8	11th	83·0	17th	·580	80·0	68·0	10th
October -	29·952	70·5	—	—	—	60·9	78·7	57·0	18th	84·0	5th	·619	83·0	66·0	6th
November -	30·002	70·9	—	—	—	58·4	78·7	52·0	28th	83·0	10th	·560	73·0	63·0	9th
December -	30·012	67·3	—	—	—	56·8	76·1	42·0	5th	79·0	17th	·549	83·0	61·5	19th
Mean -	30·055	70·1	—	—	—	60·2	79·4	54·8	—	85·1	—	·565	76·4	61·6	—

* January observations on temperature, 24 days only.
† February observations on temperature, 19 days only.

Up-Park Camp, Jamaica. Lat. 17° 59′ N.

January -	29·933	84·0	—	—	—	69·5	95·5	63·0	24th	99·0	24th	·765	64·0	52·0	13th
February-	29·907	84·7	—	—	—	73·6	95·6	63·0	23rd	98·0	5th	·824	68·0	52·0	10th
March -	29·905	85·7	—	—	—	68·8	96·0	61·0	12th	99·0	16th	·861	68·5	49·0	9th
April -	29·908	84·8	—	—	—	69·6	96·0	63·0	23rd	99·0	9th	·782	64·0	49·0	8th
May -	29·915	85·7	—	—	—	69·2	96·6	63·0	12th	99·0	6th	·828	65·9	53·0	8th
June -	29·948	85·4	—	—	—	70·1	95·4	63·0	5th	99·0	10th	·821	68·5	54·0	19th
July -	29·934	84·4	—	—	—	70·6	96·6	61·0	11th	100·0	13th	·823	71·5	58·0	14th
August -	29·926	84·4	—	—	—	69·3	95·4	61·0	2nd	99·0	4th	·840	73·6	53·6	7th
September	29·929	84·1	—	—	—	68·7	96·3	61·0	11th	102·0	4th	·844	72·5	61·0	19th
October -	29·883	84·4	—	—	—	68·5	96·1	62·0	14th	99·0	14th	·832	71·6	61·0	31st
November -	29·912	84·8	—	—	—	68·1	96·9	63·0	8th	99·0	14th	·837	67·0	53·0	30th
December -	29·882	83·6	—	—	—	68·4	96·6	63·0	13th	99·0	2nd	·800	68·5	55·0	21st
Mean -	29·915	84·7	—	—	—	69·5	96·1	62·3	—	99·2	—	·821	68·6	54·2	—

Nassau, Bahamas. Lat. 25° 5′ N.

January -	30·049	70·1	—	—	—	64·0	75·8	56·5	1st	84·0	14th	·566	75·0	50·0	2nd
February-	30·004	71·3	—	—	—	64·5	77·9	58·8	16th	85·0	10th	·568	71·0	55·2	6th
March -	30·042	74·4	—	—	—	67·6	80·1	62·8	4th	89·5	14th	·605	68·8	50·0	5th
April -	29·922	78·1	—	—	—	68·6	83·3	61·5	7th	89·8	2nd	·643	67·5	52·4	7th
May -	30·024	80·6	—	—	—	70·7	86·6	63·2	8th	93·8	29th	·692	64·2	53·0	8th
June -	30·001	82·9	—	—	—	75·1	91·1	69·5	6th	96·2	13th	·853	74·8	61·0	8th
July -	29·992	84·6	—	—	—	75·0	92·5	72·0	7th	96·8	25th	·905	75·2	56·0	31st
August -	30·000	85·2	—	—	—	75·6	91·1	71·0	23rd	97·5	8th	·912	74·4	66·0	25th
September	29·919	84·0	—	—	—	76·1	87·6	72·5	21st	90·0	18th	·900	76·4	62·5	23rd
October -	29·956	80·1	—	—	—	73·9	84·6	69·8	23rd	89·2	6th	·791	75·6	61·3	28th
November -	30·016	75·7	—	—	—	68·9	80·0	60·0	23rd	84·8	27th	·683	75·5	61·0	8th
December -	30·099	72·1	—	—	—	66·5	77·3	61·5	28th	82·5	2nd	·581	74·0	55·0	
Mean -	30·002	78·3	—	—	—	70·6	84·0	65·1	—	89·9	—	·725	73·7	56·9	—

No. XIII.—*continued.*

taken at Foreign Stations in the Year 1872.

Long. 76° 42′ W. Height of Barometer Cistern above Sea, 3,800 feet.

Mean Amount of Cloud.	Rainfall.			Weather.								Wind.								
				Number of Days of								Number of Observations under each Point.								
	Total.	Max.	Day.	Rain.	Snow.	Hail.	Thunder Storm.	Fog.	Clear Sky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
5·0	2·65	0·80	17th	7	—	—	—	—	12·0	8·0	1	—	0·1	7·5	15·5	0·5	—	0·5	—	6·0
4·0	0·14	0·08	17th	2	—	—	—	—	14·0	4·0	—	—	—	2·0	17·0	3·0	—	0·5	—	5·5
4·3	5·73	3·10	18th	9	—	—	—	—	17·5	6·5	—	—	—	—	16·5	4·0	—	2·5	—	8·0
2·7	0·67	0·32	8th	4	—	—	—	—	17·0	6·0	—	—	0·5	7·5	15·0	1·5	—	1·5	—	4·0
4·8	6·44	1·80	24th	9	—	—	4	—	10·0	4·5	—	—	1·0	10·5	11·5	0·5	—	—	—	7·5
4·7	13·36	7·70	2nd	10	—	—	4	—	13·0	6·5	—	—	—	7·5	17·0	0·5	—	—	—	5·0
4·5	7·86	4·30	25th	8	—	—	4	—	13·0	6·0	—	—	0·5	6 0	14·0	4·0	—	—	—	6·5
5·6	27·48	4·78	12th	16	—	—	6	—	11·0	10·0	1	—	4·5	7·0	13·0	2·0	—	—	—	4·5
5·2	25·93	3·40	11th	18	—	—	7	—	7·5	7·0	—	1·0	2·0	14·0	9·5	—	—	—	—	3·5
6·5	38·09	3·75	25th	19	—	—	6	—	5·5	13·0	—	—	—	13·0	12·5	1·0	2·5	0·5	—	1·5
4·7	17·39	5·60	11th	10	—	—	4	—	10·0	5·0	—	3·0	2·5	12·5	9·0	—	—	—	—	3·0
5·6	33·58	6·15	11th	14	—	—	—	—	11·5	10·0	—	0·5	2·5	14·0	11·5	—	—	—	—	2·5
4·8	179·32	7·70	2nd June	126	—	—	35	—	142·0	86·5	2	4·5	14·5	101·5	162·0	17·0	2·5	5·5	—	57·5

Long. 76° 56′ W. Height of Barometer Cistern above Sea, 235 feet.

5·5	3·60	1·08	20th	10	—	—	—	—	2·5	3·5	—	—	4·5	2·5	24·0	—	—	—	—	—
4·5	1·36	1·11	17th	2	—	—	—	—	5·5	0·5	—	—	12·0	1·0	15·0	—	—	—	—	—
4·0	1·77	0·88	6th	3	—	—	—	—	12·0	1·0	—	—	6·5	3·0	21·0	—	—	—	—	0·5
3·5	0·82	0·82	7th	1	—	—	—	—	16·0	—	—	—	2·5	—	27·5	—	—	—	—	—
4·5	2·66	0·72	2nd	8	—	—	10	—	11·0	2·5	—	—	2·0	0·5	28·0	—	0·5	—	—	—
5·0	9·85	6·18	1st	10	—	—	9	—	3·5	4·5	—	—	1·5	0·5	26·5	—	—	—	—	1·5
5·5	4·18	2·53	25th	9	—	—	11	—	7·5	5·0	—	—	0·5	—	30·0	—	—	—	—	0·5
5·5	10·34	2·92	11th	14	—	—	20	—	5·0	6·0	—	—	6·0	2·0	14·0	—	—	—	3·0	—
5·5	6·20	2·83	9th	10	—	—	22	—	2·5	2·0	—	—	22·0	3·5	3·5	—	—	—	1·0	—
5·5	5·06	2·82	20th	8	—	—	17	—	1·5	3·0	—	—	28·0	—	2·0	—	0·5	—	—	0·5
4·5	4·30	3·43	10th	5	—	—	7	—	7·5	—	—	—	28·0	—	0·5	—	—	—	—	1·5
5·5	4·16	2·13	6th	9	—	—	—	—	7·0	1·0	—	—	26·5	1·5	2·5	—	—	—	—	0·5
4·9	54·30	6·18	1st June	89	—	—	96	—	81·5	29·0	—	—	140·0	21·5	194·5	—	1·0	—	3·0	5·0

Long. 77° 21′ W. Height of Barometer Cistern above Sea, 44 feet.

8·0	5·15	1·10	30th	16	—	—	—	—	3·5	20·5	1	2·5	11·0	0·5	7·5	2·0	3·5	0·5	3·5	—
8·0	7·05	2·00	27th	11	—	—	2	—	3·5	17·0	1	1·0	2·5	0·5	9·0	3·0	3·0	0·5	8·5	—
7·3	2·36	1·05	21st	7	—	—	—	—	1·5	19·5	—	1·5	10·0	2·5	8·0	3·0	2·0	0·5	3·5	—
6·7	3·19	1·00	10th	8	—	—	1	—	4·0	13·0	—	2·5	5·0	—	11·0	3·5	2·5	1·0	4·5	—
6·2	7·28	2·20	30th	7	—	—	2	—	2·0	9·5	—	0·5	13·5	2·5	7·0	4·5	1·5	—	1·5	—
8·0	6·56	1·60	14th	19	—	—	2	—	0·0	17·5	—	2·0	7·5	1·5	11·0	1·0	4·5	0·5	2·0	—
7·1	6·05	1·88	15th	20	—	—	3	—	1·0	14·5	—	1·0	6·5	3·5	9·5	0·5	8·0	0·5	1·5	—
6·5	9·26	2·13	24th	18	—	—	1	—	0·5	10·0	—	—	6·0	0·5	15·5	—	6·0	—	3·0	—
7·0	7·15	1·60	21st	24	—	—	—	—	1·5	11·0	2	3·0	12·0	1·0	12·0	1·5	·5	—	—	—
6·6	7·37	4·50	20th	11	—	—	—	—	3·0	10·0	—	1·5	15·0	0·5	8·0	—	1·0	0·5	4·5	—
6·1	2·84	1·21	14th	9	—	—	—	—	3·5	11·0	—	1·0	15·0	2·5	4·0	·5	2·0	—	5·0	—
6·1	1·38	0·55	9th	7	—	—	—	—	3·0	9·5	1	—	14·5	1·0	5·5	1·0	2·0	—	7·0	—
7·0	65·64	4·50	20th Oct.	157	—	—	11	—	27·0	163·0	5	16·5	118·5	16·5	108·0	20·5	36·5	4·0	44·5	—

Annual Abstract of Meteorological Observations

BERMUDA. Lat. 32° 17′ N.

Month.	Mean Pressure.	Air Temperature. Hourly Means. 9 a.m.	Hourly Means. 9 p.m.	Daily Mean. Simple.	Daily Mean. Reduced.	Means of Min.	Means of Max.	Abs. Min. Temp.	Abs. Min. Day.	Abs. Max. Temp.	Abs. Max. Day.	Tension of Vapour.	Relative Humidity. Mean.	Relative Humidity. Min. Hourly.	Relative Humidity. Min. Day.
January	30·129	61·2	—	—	—	56·7	65·6	49·0	2nd	72·1	22nd	·400	73·0	56·0	2nd
February	29·994	60·9	—	—	—	56·3	66·6	44·0	20th	72·9	15th	·407	76·0	53·0	7th
March	30·069	62·9	—	—	—	56·5	67·5	50·3	2nd	73·5	13th	·395	68·0	50·0	27th
April	29·890	66·3	—	—	—	59·7	71·2	52·1	9th	79·3	29th	·461	68·0	51·0	4th
May	30·004	69·3	—	—	—	62·9	73·7	57·2	20th	78·6	28th	·519	73·0	52·0	7th
June	30·089	76·4	—	—	—	69·2	81·7	59·5	17th	88·6	28th	·703	75·0	48·0	17th
July	30·128	80·3	—	—	—	73·4	86·1	67·6	9th	91·7	28th	·789	75·0	55·0	9th
August	30·059	83·0	—	—	—	75·2	88·5	70·0	28th	93·3	3rd	·859	76·0	64·0	17th
September	30·065	80·5	—	—	—	73·4	84·5	66·8	30th	89·1	1st	·737	71·0	53·0	22nd
October	29·981	75·5	—	—	—	68·5	79·8	61·0	26th	84·6	4th	·613	68·0	49·5	29th
November	30·094	69·7	—	—	—	64·1	73·9	57·8	6th	79·3	13th	·496	66·0	50·0	2nd
December	30·074	64·2	—	—	—	59·4	68·3	53·1	29th	74·3	22nd	·404	63·0	51·0	7th
Mean	30·050	70·8	—	—	—	64·6	75·6	57·4	—	81·4	—	·564	71·0	52·7	—

SINGAPORE. Lat. 1° 16′ N.

Month.	Mean Pressure.	Air Temperature. Hourly Means. 9 a.m.	Hourly Means. 9 p.m.	Daily Mean. Simple.	Daily Mean. Reduced.	Means of Min.	Means of Max.	Abs. Min. Temp.	Abs. Min. Day.	Abs. Max. Temp.	Abs. Max. Day.	Tension of Vapour.	Relative Humidity. Mean.	Relative Humidity. Min. Hourly.	Relative Humidity. Min. Day.
January	29·320	82·9	—	—	—	69·7	92·3	67·0	2nd	96·8	7th	·956	85·0	77·0	26th
February	29·359	83·2	—	—	—	69·5	92·3	68·0	13th	94·8	20th	·956	85·0	77·6	27th
March	29·358	85·4	—	—	—	70·0	95·6	68·0	27th	98·4	20th	1·045	84·4	78·8	13th
April	29·307	85·6	—	—	—	70·6	94·8	69·4	21st	97·6	5th	1·031	84·0	79·0	29th
May	29·293	84·1	—	—	—	70·8	93·3	69·0	21st	96·4	1st	1·005	85·0	79·6	9th
June	29·285	84·4	—	—	—	70·9	92·7	69·2	27th	96·4	19th	1·011	85·9	78·6	9th
July	29·277	82·9	—	—	—	69·8	92·8	69·0	25th	96·8	6th	·983	87·5	79·0	25th
August	29·317	82·6	—	—	—	69·0	92·1	67·6	29th	94·8	19th	·936	85·5	78·5	14th
September	29·305	83·9	—	—	—	69·7	92·6	68·0	3rd	96·8	15th	·939	80·0	77·0	25th
October	29·285	85·5	—	—	—	70·4	94·2	68·0	30th	98·2	18th	·953	79·0	75·9	12th
November	29·210	84·3	—	—	—	69·7	93·4	67·8	29th	96·8	5th	·938	80·0	73·6	27th
December	29·210	82·2	—	—	—	68·8	90·4	67·0	18th	95·6	20th	·926	85·0	79·5	8th
Mean	29·294	83·9	—	—	—	69·9	93·0	68·2	—	96·6	—	·977	83·9	76·5	—

HONG KONG, CHINA. Lat. 22° 16′ N.

Month.	Mean Pressure.	Air Temperature. Hourly Means. 9 a.m.	Hourly Means. 9 p.m.	Daily Mean. Simple.	Daily Mean. Reduced.	Means of Min.	Means of Max.	Abs. Min. Temp.	Abs. Min. Day.	Abs. Max. Temp.	Abs. Max. Day.	Tension of Vapour.	Relative Humidity. Mean.	Relative Humidity. Min. Hourly.	Relative Humidity. Min. Day.
January	30·205	54·4	—	—	—	51·1	59·9	42·0	20th	76·8	1st	·362	80·6	43·5	23rd
February	30·175	55·9	—	—	—	52·7	61·1	44·2	6th	72·1	27th	·408	87·5	74·5	28th
March	30·143	62·6	—	—	—	59·1	68·5	51·8	3rd	82·4	26th	·461	79·0	56·0	19th
April	30·005	74·3	—	—	—	69·3	81·3	60·0	1st	92·0	20th	·679	79·0	57·5	25th
May	29·851	80·5	—	—	—	75·0	86·2	66·5	3rd	94·6	28th	·823	80·0	65·0	4th
June	29·774	82·9	—	—	—	78·6	88·2	74·2	22nd	93·8	25th	·875	77·6	64·0	13th
July	29·816	86·0	—	—	—	80·1	93·6	77·0	30th	97·8	10th	·914	72·0	68·0	11th
August	29·838	83·0	—	—	—	77·8	90·7	73·6	13th	97·2	21st	·931	80·0	65·0	25th
September	29·792	83·7	—	—	—	78·3	92·5	70·4	11th	98·1	21st	·827	70·2	58·4	19th
October	29·934	79·3	—	—	—	75·3	84·2	68·1	30th	92·8	6th	·787	80·0	55·0	24th
November	30·064	72·4	—	—	—	67·0	77·9	57·0	29th	86·8	7th	·544	66·0	48·0	16th
December	30·105	64·1	—	—	—	58·5	69·0	40·5	27th	81·2	5th	·478	77·5	57·0	17th
Mean	29·975	73·3	—	—	—	68·6	79·4	60·4	—	88·8	—	·674	77·5	58·3	—

No. XIII.—*continued.*

taken at Foreign Stations in the Year 1878.

Long. 64° 47′ W. Height of Barometer Cistern above Sea, 151 feet.

Mean Amount of Cloud.	Rainfall.			Weather.								Winds.								
				Number of Days of								Number of Observations under each Point.								
	Total.	Max.	Day.	Rain.	Snow.	Hail.	Thunder Storm.	Fog.	Clear Sky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
7·6	5·70	0·98	31st	20	—	1	—	—	4·0	18·5	0·0	5·0	4·0	3·0	2·0	3·0	5·0	4·0	5·0	0·0
6·8	7·51	2·60	10th	19	—	—	1	1	5·0	11·0	0·0	4·0	0·0	0·0	2·0	2·0	10·0	4·0	6·0	0·0
6·5	4·31	0·93	4th	12	—	—	1	—	6·0	14·0	—	8·0	3·0	2·0	1·0	2·0	8·0	1·0	6·0	0·0
5·5	5·14	1·70	30th	14	—	—	1	—	9·5	9·0	—	3·0	2·0	1·0	4·0	4·0	6·0	4·0	6·0	0·0
5·9	2·70	1·06	30th	12	—	—	2	—	10·0	12·0	—	8·0	1·0	1·0	2·0	1·0	10·0	3·0	5·0	0·0
6·2	6·04	1·47	3rd	17	—	—	3	—	4·5	11·5	—	4·0	1·0	0·0	3·0	1·0	11·0	2·0	2·0	6·0
6·0	5·96	1·96	24th	16	—	—	3	—	6·0	15·0	—	0·0	1·0	2·0	4·0	5·0	13·0	2·0	2·0	2·0
4·6	8·02	2·30	27th	17	—	—	4	—	13·5	5·5	1	1·0	0·0	0·0	4·0	2·0	13·0	5·0	4·0	2·0
4·8	7·39	3·52	29th	11	—	—	2	—	13·0	6·0	—	3·0	5·0	1·0	12·0	2·0	4·0	—	—	3·0
4·8	4·44	2·62	12th	16	—	—	1	—	13·5	10·0	—	2·0	7·0	4·0	3·0	3·0	3·0	2·0	2·0	5·0
6·5	6·20	2·58	21st	14	—	—	2	—	4·5	13·0	—	5·0	4·0	1·0	3·0	2·0	7·0	3·0	4·0	1·0
6·0	3·39	1·05	10th	14	—	—	1	—	7·0	9·0	1	7·0	2·0	0·0	2·0	1·0	4·0	5·0	9·0	1·0
5·9	66·80	3·52	29th Sept.	182	—	1	21	1	96·5	134·5	2·0	50·0	30·0	15·0	42·0	28·0	94·0	35·0	51·0	20·0

Long. 105° 31′ E. Height of Barometer Cistern above Sea, 110 feet.

5·0	11·41	1·83	2nd	21	—	—	1	—	3·0	2·5	—	—	31	—	—	—	—	—	—	—
4·0	3·19	0·49	23rd	19	—	—	2	—	7·5	—	—	—	28	—	—	—	—	—	—	—
3·0	0·52	0·28	10th	4	—	—	1	—	15·0	—	—	—	31	—	—	—	—	—	—	—
4·0	9·54	1·44	27th	15	—	—	9	—	7·0	—	—	—	—	—	—	—	30	—	—	—
5·0	11·70	1·45	2nd	25	—	—	8	—	2·5	2·5	—	—	—	—	—	—	31	—	—	—
4·0	4·29	2·15	21st	13	—	—	4	—	9·0	2·0	—	—	—	—	—	—	30	—	—	—
4·5	3·33	0·58	19th	14	—	—	7	—	7·5	1·5	—	—	—	—	—	—	31	—	—	—
4·5	14·50	5·08	28th	20	—	—	2	—	7·0	2·0	—	—	—	—	—	—	31	—	—	—
4·0	3·70	0·86	9th	12	—	—	5	—	12·0	1·0	—	—	—	—	—	—	30	—	—	—
3·5	4·20	1·32	7th	12	—	—	5	—	11·5	0·5	—	—	31	—	—	—	—	—	—	—
3·5	8·22	1·56	7th	18	—	—	5	—	11·0	0·5	—	—	30	—	—	—	—	—	—	—
4·0	10·14	2·08	9th	23	—	—	2	—	11·0	2·0	—	—	31	—	—	—	—	—	—	—
4·1	84·74	5·08	28th Aug.	196	—	—	51	—	104·0	14·5	—	—	182	—	—	—	183	—	—	—

Long. 114° 9′ E. Height of Barometer Cistern above Sea, 18 feet.

8·0	1·74	1·14	2nd	5	—	—	1	—	5·0	22·5	—	1·0	3·0	8·0	—	—	0·5	6·5	4·0	8·0
9·3	2·96	0·67	25th	14	—	—	—	—	0·5	24·0	—	—	3·5	14·0	—	—	—	2·0	0·5	8·0
8·2	5·57	1·25	4th	11	—	—	3	—	3·5	22·0	—	—	3·0	19·0	0·5	—	—	1·0	—	7·5
6·0	3·14	1·90	12th	7	—	—	3	—	10·5	11·5	—	—	4·0	16·0	1·0	1·0	—	1·0	—	7·0
7·8	20·58	14·11	21st	11	—	—	5	—	2·5	19·5	—	—	1·5	12·5	1·0	3·0	2·5	5·0	0·5	5·0
7·9	15·69	3·46	17th	18	—	—	4	—	1·5	18·5	—	—	—	9·0	—	—	—	10·0	—	11·0
5·6	5·78	1·91	15th	11	—	—	4	—	7·5	9·5	—	1·0	—	8·0	—	2·0	—	8·0	—	12·0
7·2	16·31	3·70	21st	16	—	—	1	—	5·0	16·5	—	—	—	5·0	—	1·5	—	13·5	—	11·0
5·3	1·95	0·87	14th	3	—	—	1	—	9·5	10·0	—	2·5	—	10·0	—	2·5	—	10·5	—	4·5
7·0	16·18	3·30	8th	10	—	—	—	—	7·0	16·5	—	3·0	—	26·0	—	—	—	—	—	2·0
5·1	—	—	—	—	—	—	—	—	10·0	8·5	—	3·5	—	20·0	—	—	—	—	—	6·5
6·6	—	—	—	—	—	—	—	—	5·5	13·5	—	9·5	—	15·5	—	—	—	0·5	—	5·5
7·0	89·9	14·11	21st May	106	—	—	23	—	68·0	192·5	—	20·5	15·0	163·0	2·5	10·0	3·0	58·0	5·0	88·0

Appendix

Summary of Results of Meteorological Observations

Stations, with their Height above the sea.	Mean Pressure.	Air Temperature.							Tension of Vapour.	Relative Humidity.		
		Hourly Means.	Means of		Abs. Min.		Abs. Max.				Min.	
		9 a.m.	Min.	Max.	Temp.	Day.	Temp.	Day.		Mean.		Day.
	ft.											
Mediterranean:												
Gibraltar* - -	53	30·054	63·7	59·2	72·2	39·5	13 Jan.	91·0	22 July	·496	80·7	51·0 8 Dec.
Malta - - -	70	29·968	68·9	62·6	72·5	40·0	27 Jan.	93·0	24 July	·517	70·5	38·0 19 Aug.
Scutari† - - -	60	29·930	60·1	49·6	69·7	23·8	15 Feb.	100·4	1 Sept.	·404	73·1	43·2 [illegible] Sept.
African:												
Fort Napier, Natal‡	2,200	29·899	66·8	51·8	80·8	33·7	14 Sept.	111·7	8 Jan.	·358	50·9	23·0 [illegible] July
Sierra Leone - -	224	29·954	82·7	74·4	89·7	67·0	31 Dec.	96·0	22 Feb.	·957	85·9	53·0 [illegible] July
America & W. Indian:												
Barbadoes - -	30	30·014	83·6	75·7	87·4	69·0	1 Mar.	93·0	16 Oct.	·807	69·7	35·5 4 April
Newcastle, Jamaica§	3,800	30·055	70·1	60·2	79·4	42·0	5 Dec.	89·0	2 Mar.	·565	76·4	54·0 [illegible] April
Up-Park Camp, Jamaica -	235	29·915	84·7	69·5	96·1	61·0	12 Mar.	102·0	4 Sept.	·821	66·6	46·0 [illegible] Mar.
Nassau, Bahamas	44	30·002	78·3	70·6	84·0	56·5	1 Jan.	97·5	8 Aug.	·725	72·7	50·0 1 Jan.
Bermuda - -	151	30·050	70·8	64·6	75·6	44·0	20 Feb.	93·3	3 Aug.	·564	71·0	46·0 [illegible] June
Singapore - -	110	29·294	83·9	69·9	93·0	67·0	2 Jan.	98·4	20 Mar.	·977	83·9	73·5 [illegible] Dec.
Hong Kong -	18	29·975	73·3	68·6	79·4	40·5	27 Dec.	98·1	21 Sept.	·674	77·5	43·5 [illegible] Jan.

* Gibraltar. Observatory under repairs from September to 1st December. Temperature and rain fall recorded for 9 months only.

† Scutari. Observations on wind half a day short in April, June, October, December; 1 day short in September.

No. XIII.—*continued.*

taken at Foreign Stations in the Year 1878.

Mean amount of Cloud.	Rainfall.			Weather.							Wind.									Latitude.	Longitude.
				Number of days of							No. of Observations under each Point.										
	Total.	Max.	Day.	Rain.	Snow.	Hail.	Thunder-storm.	Fog.	Clear sky.	Overcast.	Gales.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.		
																				° ′	° ′
3·8	18·01	3·30	12 Dec.	45	—	1	4	9	201·5	43·5	19	29·5	30·0	134·0	8·5	1·5	13·0	127·5	18·0	3·0	36 6 N.	5 20 W.
4·0	16·96	3·50	11 Nov.	70	—	—	5	—	136·5	70·0	—	15·5	68·5	16·0	68·5	4·0	33·5	14·0	145·0	—	35 53 N.	14 30 E.
5·2	34·55	1·35	1 Aug.	128	17	4	15	10	143·0	135·0	6	60·0	192·0	34·5	8·5	54·5	63·5	15·5	5·5	28·0	41 0 N.	29 3 E.
4·6	10·69	1·12	29 Jan.	66	—	5	38	—	121·5	105·0	—	5·5	62·5	118·5	30·5	3·0	2·5	5·0	15·0	2·0	29 3 S.	30 e E.
3·4	203·4	9·42	24 Sept.	169	—	—	60	—	218·5	—	—	10·0	3·5	62·0	0·5	11·0	39·5	142·0	23·0	73·5	8 29 N.	13 9 W.
3·8	55·8	3·00	1 Sept.	116	—	—	—	—	213·5	33·5	—	13·0	258·0	54·0	34·0	2·0	3·0	1·0	—	—	13 4 N.	59 40 W.
4·8	179·32	7·70	2 June	126	—	—	35	—	142·0	86·5	2	4·5	14·5	101·5	162·0	17·0	2·5	5·5	—	57·5	18 62 N.	76 42 W.
4·9	54·30	6·18	1 June	89	—	—	96	—	81·5	29·0	—	—	140·0	21·5	194·5	—	1·0	—	3·0	5·0	17 59 N.	76 56 W.
7·0	65·64	4·50	20 Oct.	157	—	—	11	—	27·0	163·0	5	16·5	118·5	16·5	108·0	20·5	36·5	4·0	44·5	0·0	25 5 N.	77 21 W.
5·9	66·80	3·52	29 Sept.	182	—	1	21	1	96·5	134·5	2·0	50·0	30·0	15·0	42·0	28·0	94·0	35·0	51·0	20·0	32 17 N.	64 47 W.
4·1	84·74	5·08	28 Aug.	196	—	—	51	—	104·0	14·5	—	—	182·0	—	—	—	183·0	—	—	—	1 16 N.	105 31 E.
7·0	89·9	14·11	21 May	106	—	—	22	—	68·0	192·5	—	20·5	15·0	163·0	2·5	10·0	3·0	58·0	5·0	88·0′	22 16 N.	114 9 E.

‡ Fort Napier, Natal. Mean of 8 months only. No observations February, March, April, May.
§ Newcastle, Jamaica. Observations on temperature 24 days only in January, and 19 days in February.

APPENDIX No. XIV.

TABLE showing the AVERAGE STRENGTH of the TROOPS at each of the PRINCIPAL STATIONS in the UNITED KINGDOM, with the ADMISSIONS into HOSPITALS for PRIMARY VENEREAL SORES and GONORRHŒA respectively in each year from 1860 to 1878 inclusive.

Stations.	1860.			1861.			1862.			1863.			1864.			1865.			1866.		
	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.
Devonport and Plymouth	3,825	609	684	3,537	703	623	3,426	500	497	2,782	344	354	2,481	274	287	2,569	342	377	2,556	209	432
Portsmouth	5,710	1,073	1,057	5,107	851	1,041	4,691	608	839	4,630	497	669	4,436	538	578	4,824	545	662	4,510	452	747
Chatham and Sheerness	5,647	601	919	4,609	470	622	3,634	327	511	3,899	366	590	3,804	334	554	4,188	360	584	3,095	259	497
Woolwich	6,877	1,280	1,065	5,967	823	894	5,887	781	878	5,234	500	641	4,824	384	417	4,795	363	394	4,607	410	385
Aldershot	15,164	1,939	1,681	12,898	1,894	1,362	12,078	1,400	1,548	11,746	1,297	1,116	10,700	1,129	1,301	11,049	1,108	1,235	9,211	742	815
Windsor	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Shorncliffe	3,631	476	386	3,758	459	434	3,589	234	389	2,905	236	328	2,530	208	231	2,744	187	265	2,404	137	267
Colchester	2,609	440	451	2,135	286	350	1,479	233	247	1,850	241	289	2,089	247	370	2,366	254	398	2,255	389	422
Winchester	1,449	176	293	1,186	118	198	674	107	133	621	63	88	647	72	117	978	71	202	928	43	137
Dover	2,405	365	306	2,339	352	432	2,054	212	299	2,188	215	325	2,214	199	206	2,387	160	174	2,078	186	217
Canterbury	1,880	155	237	1,593	227	254	1,124	119	247	1,079	147	209	1,178	80	204	1,000	77	100	931	109	122
Maidstone	492	52	59	412	14	39	271	6	17	299	24	24	216	8	9	344	61	68	375	52	55
Cork	1,848	222	205	1,835	217	248	1,408	153	131	1,126	108	92	1,070	81	111	1,423	122	126	1,768	87	112
Curragh	5,942	1,017	623	5,962	853	636	5,007	544	547	5,060	615	477	4,505	581	418	4,411	427	352	4,758	360	365
Isle of Wight	1,245	111	163	1,164	100	135	800	86	134	1,037	50	125	1,118	83	162	1,210	39	199	1,220	14	241
London	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Warley	No returns.			336	30	34	823	62	116	692	88	135	581	30	97	619	60	119	1,020	81	211
Hounslow	386	46	37	367	49	30	547	52	9	513	45	26	536	24	12	514	12	16	524	11	30
Pembroke Dock	1,315	92	125	1,262	87	147	750	36	73	819	43	75	805	52	84	419	35	24	748	23	39
Sheffield	509	85	67	632	61	63	573	76	70	626	47	46	567	31	48	703	66	89	595	63	75
Manchester	1,168	135	130	1,118	258	210	1,051	185	192	1,031	96	117	962	100	91	940	119	142	813	75	120
Preston	944	126	190	1,068	88	82	710	38	134	698	39	96	855	85	196	1,033	88	214	847	64	109
Edinburgh	1,471	173	197	1,496	145	176	1,469	98	207	1,303	138	176	1,128	74	110	1,175	132	155	1,059	61	86
Fermoy	1,666	172	173	1,820	117	145	1,204	45	83	1,355	87	122	1,425	49	102	888	39	40	844	30	53
Limerick	1,257	154	229	1,246	150	157	1,064	148	146	910	146	68	783	101	71	813	58	143	767	37	42
Athlone	922	81	201	717	100	82	810	41	90	876	38	112	738	107	93	439	68	37	576	24	51
Dublin	5,423	1,009	708	4,899	706	568	4,648	577	715	4,022	741	647	4,607	825	494	4,307	659	626	4,086	627	566
Belfast	812	108	154	1,001	158	196	640	58	101	950	54	71	789	86	76	941	43	164	596	44	51
London and Windsor combined	5,782*	766	297	5,757	889	299	4,755	621	567	4,987	745	361	5,088	808	389	5,391	738	387	5,240	791	322

Stations.	1867.			1868.			1869.			1870.			1871.			1872.		
	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.
Devonport and Plymouth	2,448	135	434	2,418	159	359	2,199	163	274	2,208	85	263	3,200	159	614	2,748	101	421
Portsmouth	4,351	504	783	4,928	423	925	4,668	239	586	4,548	232	564	5,656	231	794	6,005	241	724
Chatham and Sheerness	4,461	317	567	4,489	294	690	4,024	163	457	4,115	192	434	4,719	300	659	4,074	228	414
Woolwich	4,392	433	563	5,003	233	474	5,251	271	465	5,569	241	547	5,814	336	754	6,257	373	860
Aldershot	7,994	636	784	9,879	760	962	10,468	663	1,103	11,235	757	1,063	15,418	1,011	1,706	12,741	786	1,352
Windsor	1,974	68	60	1,953	145	66	1,835	96	84	1,970	73	83	1,946	81	55	1,835	99	61
Shorncliffe	2,616	111	328	2,554	197	314	2,687	163	271	2,146	80	157	2,538	87	245	2,738	91	144
Colchester	2,278	346	536	2,060	374	440	1,888	100	273	1,677	70	214	2,331	74	240	2,124	117	306
Winchester	906	47	116	883	92	153	794	80	104	441	27	57	752	23	75	837	48	55
Dover	2,014	287	275	2,366	263	428	2,455	195	253	2,477	75	223	2,759	70	233	2,691	127	203
Canterbury	981	116	173	1,148	151	241	956	43	130	782	111	129	985	37	243	801	38	129
Maidstone	894	98	108	453	53	98	443	57	117	295	14	35	338	15	19	831	19	51
Cork	1,870	113	119	1,443	88	117	1,824	119	131	1,535	129	140	2,345	129	213	2,536	161	218
Curragh	3,951	409	400	3,835	335	380	3,412	299	219	3,273	183	224	5,714	202	390	5,067	254	363
Isle of Wight	1,105	65	183	976	101	145	998	129	185	806	53	94	1,147	76	147	1,190	93	102
London	4,380	715	550	4,383	645	526	4,155	597	271	4,294	639	283	4,289	657	363	4,708	837	356
Warley	1,228	91	263	824	76	149	661	40	52	600	63	68	1,073	61	127	711	47	81
Hounslow	408	31	48	416	44	34	483	41	41	538	47	47	753	34	41	607	60	50
Pembroke Dock	968	97	85	1,248	44	104	1,035	53	66	772	43	89	1,057	30	98	935	25	61
Sheffield	800	130	227	801	86	153	644	94	88	689	53	90	780	93	153	857	82	154
Manchester	1,021	181	244	1,142	132	129	914	146	100	1,084	100	144	1,133	70	145	944	92	133
Preston	1,046	93	193	883	77	161	874	150	178	538	75	83	916	69	130	874	100	114
Edinburgh	1,024	65	152	1,118	51	91	1,063	63	87	1,056	105	124	1,106	76	98	1,062	46	116
Fermoy	1,077	75	101	967	41	87	872	101	70	1,271	110	65	1,250	41	46	1,128	65	79
Limerick	895	100	91	899	103	103	755	41	38	722	98	57	748	42	76	802	80	63
Athlone	679	88	70	548	21	53	553	23	32	493	21	57	465	23	37	720	10	29
Dublin	5,373	685	656	4,896	680	579	4,294	772	549	4,495	576	452	4,658	546	575	4,914	813	737
Belfast	616	46	36	619	29	123	446	23	68	487	21	70	657	40	101	488	34	43

Stations.	1873.			1874.			1875.			1876.			1877.			1878.		
	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.	Strength.	Venereal Sores.	Gonorrhœa.
Devonport and Plymouth	3,036	112	289	2,936	106	185	2,575	75	157	2,658	71	247	2,934	83	239	3,227	111	322
Portsmouth	5,721	250	564	6,003	287	398	5,555	169	384	5,592	151	385	4,575	124	369	5,733	84	372
Chatham and Sheerness	4,202	172	334	4,257	140	259	4,542	75	226	4,588	151	282	5,080	219	429	5,734	280	586
Woolwich	6,215	370	600	6,206	293	419	5,605	330	392	5,783	241	470	6,246	179	395	6,455	244	506
Aldershot	11,821	852	1,068	12,922	666	900	12,934	600	814	12,055	563	901	14,416	657	978	13,775	730	1,156
Windsor	1,089	92	58	1,037	65	42	972	40	43	956	30	78	1,020	82	77	1,096	43	80
Shorncliffe	2,238	47	136	2,438	35	109	2,695	48	80	2,748	60	115	2,932	62	117	3,314	136	143
Colchester	1,873	78	161	1,685	34	106	2,248	72	180	2,631	80	190	2,502	79	158	2,863	83	262
Winchester	679	18	46	994	38	63	957	26	66	963	29	85	1,004	18	119	1,129	43	124
Dover	2,365	91	149	2,381	87	164	2,300	63	118	2,478	75	112	3,225	62	178	3,244	102	203
Canterbury	1,015	20	106	987	36	63	1,138	14	76	1,408	38	80	1,378	26	107	1,460	40	83
Maidstone	272	16	33	212	14	11	138	1	5	106	3	2	119	4	8	146	1	11
Cork	2,525	153	168	2,116	54	85	2,689	57	101	2,520	54	150	2,437	39	90	2,459	88	107
Curragh	4,990	149	234	3,962	182	164	4,258	147	183	4,112	76	205	4,554	175	321	5,218	280	397
Isle of Wight	1,128	42	75	1,206	107	142	1,222	109	68	1,139	61	73	1,092	56	95	1,311	66	79
London	4,278	790	381	3,996	716	412	3,897	730	373	3,735	545	366	3,979	660	598	4,246	1,060	640
Warley	963	21	77	941	30	73	819	30	70	824	42	79	1,129	67	138	722	101	116
Hounslow	631	42	43	663	45	34	660	16	29	666	50	39	621	30	39	774	31	48
Pembroke Dock	1,282	32	61	1,359	29	69	1,218	38	43	972	28	47	863	14	56	963	12	44
Sheffield	732	52	110	801	39	73	779	68	71	812	97	72	881	56	90	840	81	137
Manchester	1,028	94	115	1,058	112	96	1,068	95	115	1,063	120	162	1,106	157	214	1,199	246	212
Preston	834	103	151	672	65	85	749	43	54	819	63	86	848	65	96	993	70	141
Edinburgh	1,154	51	75	1,253	31	56	1,222	33	85	1,155	103	86	1,122	53	74	1,366	98	137
Fermoy	967	20	37	768	8	14	1,200	15	39	1,182	37	76	886	26	42	694	18	52
Limerick	882	69	84	829	48	22	993	23	29	802	38	41	845	63	79	918	78	96
Athlone	637	9	13	592	5	14	818	8	13	603	5	30	709	25	41	760	22	54
Dublin	4,608	629	569	3,946	375	289	4,267	311	370	4,062	310	459	4,151	425	574	5,067	779	639
Belfast	687	71	97	796	51	71	751	33	46	956	55	61	772	58	96	924	61	113

APPENDIX No. XV.

PRIZE FOR ESSAY ON FEVERS.

Surgeon-General C. A. Gordon, M.D., C.B., Honorary Physician to Her Majesty, with the approval of Government, offers a prize of Rupees 500 to the writer of the best essay on fevers as affecting British soldiers in India. Particulars with regard to conditions, arbitrators, date, and manner of submitting essays are given below, namely:—

2. The essays must include a comparative history of that class of diseases as given by the older writers and by the more modern; their causes, including such as are predisposing and those that are direct or exciting; their relative prevalence and mortality according to age and residence in India; their modifications by diathesis, locality, climate, and season; their pathology; their treatment, illustrating this important point, as far as possible, by records of "cases" either from case-books or published works dating previous to 1857, and of those of a date subsequent to that period; the object being to indicate as clearly as may be practicable the results of the several methods adopted, and thus obtain a guide with regard to the future.

3. The assigned causes of *fevers* being investigated and categorically detailed, measures will be indicated by which their prevalence among British troops and their present very serious rate of mortality may for the future be diminished.

4. With reference to what some writers may in their essays designate *enteric* or *typhoid fever*, they will give a distinct definition of the precise significance attached by them to these terms, whether applied in a sense independent of each other or synonymously; also in the event of either term being used to indicate a specific and otherwise independent disease rather than a *condition of*, or *complication* occurring in, the course of endemic fevers, whether continued or periodic in type, a distinct and precise record must be given of the circumstances upon which the distinction thus indicated is based.

5. The prize now offered will be open to all officers of the Army Medical Department and of the Indian Medical Service of the three presidencies, whether upon retired or full pay, provided that they have on 31st August 1879 severally done medical duty with British troops in India during five full years and upwards.

6. The award of the prize now offered shall rest with three arbitrators, who must themselves have done duty for at least five years with British troops in India, and have been at least 10 additional in this country, making in all not less than 15 full years in India. Government has been solicited to request the Director-General of the Army Medical Department, the Right Honourable the Secretary of State for India, and the Army Sanitary Commission each to appoint one of the three arbitrators, the latter unconnected with the Commission itself; these three to have power, should they so desire to add two to their number so as to make it five in all; and at least one of the arbitrators to have himself served in India as above during not less than 10 years prior to 1857.

7. Essays by officers of the Army Medical Department should be transmitted through the usual channel to the Director-General of that department; those by officers of the Indian Medical Service through their channel of communication to the India Office.

8. With a view to afford ample time for the preparation of essays, the 31st of December 1881 will be the latest date on which those essays will be received in the India Office or that of the Director-General, and the decision of the arbitrators as to the award of the prize for the best of those essays will be published in England and India, if possible, not later than 31st of July 1882.

9. In the event of no essay being laid before the arbitrators, or of their considering it desirable for other reasons to withold the reward for the present, they are hereby authorised to re-model the conditions of award in such manner as to them may appear fit, bearing in mind the general object in view in offering the prize as above detailed.

4th September 1879.

APPENDIX No. XVI.

THE ALEXANDER MEMORIAL FUND.

COMMITTEE.

Sir WILLIAM M. MUIR, K.C.B., M.D., Hon. Physician to the Queen, Director-General, Army Medical Department, *President*.
Sir T. GALBRAITH LOGAN, K.C.B., M.D., Hon. Physician to the Queen.
Surgeon-General T. G. BALFOUR, M.D., F.R.S.
Surgeon-General T. LONGMORE, Hon. Surgeon to the Queen, Professor of Military Surgery.
Deputy Surgeon-General J. A. BOSTOCK, C.B., M.D., Hon. Surgeon to the Queen.
Deputy Surgeon-General W. J. FYFFE, M.D.
Surgeon-Major F. S. B. F. DE CHAUMONT, Professor of Military Hygiene.
Inspector-General of Hospitals, R. LAWSON, M.D.
Surgeon-General WM. RUTHERFORD, C.B., M.D.
Surgeon-General WM. MUNRO, C.B., M.D.
Surgeon-General Sir A. D. HOME, K.C.B., V.C.
Surgeon-Major FREDERICK ROBINSON, M.D., Scots Guards.

AT a meeting of the Committee, held at the Army Medical Department, 6, Whitehall Yard, July 9th, 1879, it was unanimously resolved that the Prize of 50*l.* and a Gold Medal of the value of 10*l.* be awarded to Surgeon J. Martin, A.M.D. (date of commission March 31st, 1874), for the best Essay "On the "influence of drinking water in originating or propagating enteric fever, "diarrhœa, dysentery, and cholera: to be illustrated, as far as possible by "instances under the personal observation of the author."

It was also determined that the subject for the next competition should be "On the prevalence of enteric fever in the Army; its etiology, pathology, and "treatment: to be illustrated by the personal observation of the author"; and that a Prize of 50*l.* and a Gold Medal of the value of 10*l.* be offered for the best Essay written thereon.

Essays to be despatched so as to reach the President of the Committee on or before the 31st December 1881.

Essays are to be legibly and clearly written, superscribed with a brief motto, and accompanied by a sealed envelope, similarly superscribed, containing the name and address of the author.

The competition to be limited to Executive Medical Officers of the Army on full-pay.

The relative merits of the Essays to be determined by Assessors to be selected by the Committee.

The Prize to be awarded to the best Essay offered, without reference to the number of competitors, provided the writer has complied with the prescribed conditions.

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